PUBLIC HEALTH REPORTS

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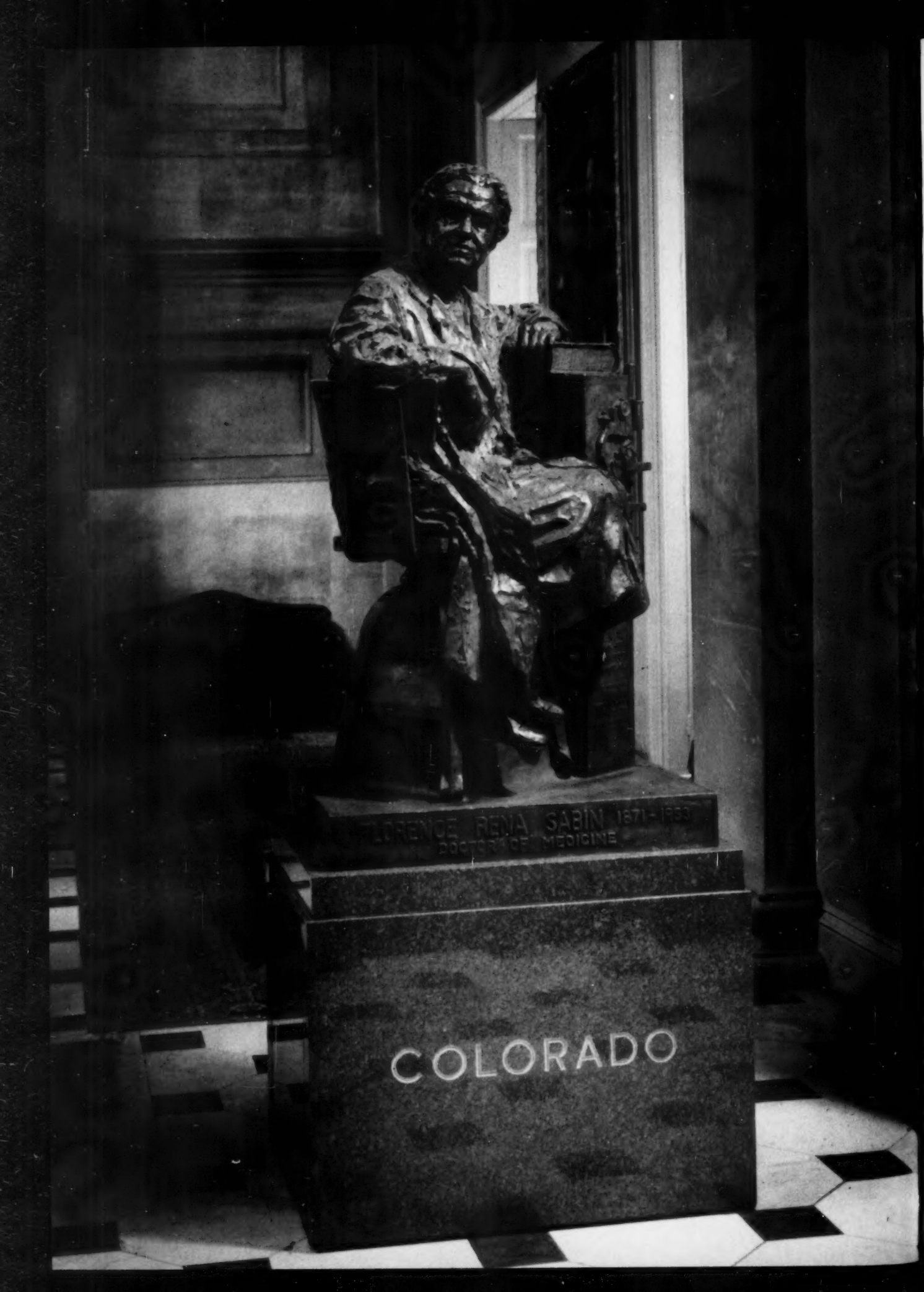
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service


FLORENCE RENA SABIN 1871-1953
DOCTOR OF MEDICINE
COLORADO

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Volume 74 Number 10

OCTOBER 1959

Published since 1878

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frontispiece

Dr. Florence Rena Sabin, 1871–1953, distinguished physician and research scientist, represents Colorado in National Statuary Hall in the U.S. Capitol. The figure was sculptured by Joy Buba of New York City (see p. 903).

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PUBLIC HEALTH REPORTS

Public Health Reports, published since 1878 under authority of an act of Congress of April 29 of that year, is issued monthly by the Public Health Service pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220. Use of funds for printing this publication approved by the Director of the Bureau of the Budget, August 24, 1957.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

ARTHUR S. FLEMMING, *Secretary*

PUBLIC HEALTH SERVICE

LEROY E. BURNEY, *Surgeon General*

A Philadelphia center gives the city's senior citizens professional aid in coping with the mental hazards of aging.

A Mental Health Program for the Later Years

JACOB TUCKMAN, Ph.D., and ALICE T. DASHIELL

TODAY'S increased proportion of older people in the population has intensified our interest in more complete understanding of the adult. Society recognizes and accepts the facts of the physical changes with age, but has not recognized fully its economic implications and its social and psychological consequences.

Lessened opportunities for gainful employment, the need to live on a reduced income, the decreased size of the household owing to the dispersion of the family now grown up, widowhood, death of contemporaries, gradual or sudden loss of health, the time and energy costs of traveling or carrying on a hobby, all these and many more problems demand adjustment. Some adults can make such adjustments with great flexibility, but many others do not.

Statistics pertaining to admissions to State hospitals and the age distribution of their resident-patient population indicate the difficulty experienced by some older people in making a satisfactory adjustment to their day-to-day problems. For the year 1955 in the United States, 26 percent of all first admissions to State hospitals were people 65 years of age and over, and 28 percent of the resident-patient population were in this age group (*1*).

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Community Services

Most older people have the potential for meeting many of their special needs and problems but they may require help at some crucial point. Unfortunately, community services, especially to the nonindigent aged, have not kept pace with the need. Mathiasen has pointed out that in the distribution of funds by community chests and united funds in 255 cities, the amount allocated to care of the aged is at the bottom of the list (*2*).

Most services for noninstitutionalized older people have taken the form of "golden age clubs" where opportunities for recreation and social contacts are given. Less frequently, activity centers include facilities for arts and crafts, adult education, and cultural interests, in addition to opportunities for recreation and socialization. While golden age clubs and activity centers for older people have been useful as focal points in promoting the welfare of older persons, they have certain shortcomings. They focus only on some needs of the person rather than his total needs. Frequently leaders are untrained in dealing with the pressing prob-

lems confronting the older person. And standards of operation are often below normal in terms of physical facilities, program, and staff.

The Philadelphia Plan

To give full recognition to the importance of the whole person in meeting the needs of older people, the Philadelphia Department of Public Health, through its division of mental health, established the Adult Health and Recreation Center as a demonstrational mental health facility designed to serve the following purposes:

1. Provide evaluation, counseling, and supportive services to help older adults understand their own aging as a natural process, to develop satisfying and continuing interests, to promote constructive individual and group relationships, to promote physical and emotional well-being, and to help them understand and adjust to the economic, physiological, and psychological problems associated with aging.

2. Provide training for individuals who plan to work with older people or who are presently engaged in such work.

3. Conduct research and make the center available to educational institutions as a research center to develop a better understanding of the aging process and of the problems and treatment of "normal" older people.

The center, officially opened in the middle of November 1958, is well located. According to the 1950 census of population, more than 6,000 persons 65 years of age and older live within a mile of the center. The median income for a family of five within this area is $3,100 a year.

While the center offers the range of activities usually available in golden age clubs or other centers for older people, it possesses an unprecedented factor of clinical orientation within the various related professional disciplines of psychiatry, psychology, social work, public health nursing, and general medicine. The center is designed for "normal" older people and is not a treatment center for the physically or mentally ill. The center is open from 8:45 a.m. to 5:15 p.m. Monday through Friday although at present the group program is conducted from 9:30 a.m. to 12:30 p.m. daily. Afternoon activities will be scheduled when funds become available.

A series of afternoon meetings open to the public has been started. The first dealt with the medical problems of men and women past middle age and accident prevention in the later years. Future meetings will be devoted not only to health but also to income maintenance, housing, use of leisure time, mental health, and other aspects of aging. With the help of a consultant in nutrition, consideration is being given to a lunch program.

Because of the experimental nature of the center, emphasis is placed on an intensive service to a limited number of people rather than an attempt to meet the needs of older people on a mass basis. On any one day, the number of people to be served may be limited to about 50, but the decision regarding the optimum size of the group will be made after more experience with the program. However, total enrollment may be as high as 200 to 250 since all participants would not use the center's facilities every day.

The center is operated under the joint sponsorship of Philadelphia's Department of Public Health and Department of Recreation and the Pennsylvania Department of Public Welfare. A group of professional and lay leaders serve as an advisory committee.

Staffing and Policies

A State grant of $15,000 for the current fiscal year makes it possible to hire a social worker as director of the center, a secretary on a full-time basis, three recreation leaders, and an occupational therapist 15 hours a week, and to meet certain overhead expenses. With the exception of the occupational therapist, the personnel mentioned have been hired. The department of public health has contributed to the program the services of a physician, two psychiatrists, two psychologists, a psychiatric caseworker, and a mental health consultant in public health nursing. With the exception of the general medical practitioner who is at the center 9 hours a week, each of these staff members devotes 3 hours a week to the program. Certain supplies and equipment are also provided by the health department. The department of recreation has made space available for housing the program in its most modern plant, built at a cost of $1½ million.

Handicraft activities in Philadelphia's mental health program for the later years

It is the policy of the center to accept into membership only ambulatory persons able to care for their own physical needs who are sufficiently well oriented mentally to make constructive use of the program. Although publicity has indicated that the program is available to persons 60 years of age and older to prevent confusion about the purpose of the center, admission is open to any adult who can benefit from the program. A number of people in their fifties with problems of aging have been accepted. There are no eligibility requirements with respect to sex, race, ethnic affiliation, or residence within the city. Applicants may be referred from any source or may be self-referred. No charge is made for any service.

Before admission to the center, the applicant goes through an intake process which is limited usually to one interview but may include medical or psychiatric consultation. At the interview, the applicant discusses his problems as he sees them and his views on the center as a possible source of help. The social worker explains to the applicant the various phases of the center's program and together they select the pertinent services. Many applicants request immediate medical consultation and referral for treatment. Other applicants have expressed unhappiness, anxieties, nervousness, or symptoms which they describe as "breakdown." For these men and women, psychiatric consultation is offered and accepted readily. In other cases the important problem is finding full- or part-time employment. Usually, the applicant requests an opportunity to participate in the recreational and social activities.

The only requests for service that have been rejected are from agencies seeking psychiatric diagnostic services for clients who would not be able to participate in the center's program. In such cases, it has been explained that the center operates as a unit, combining recreation with medical, psychiatric, psychological, and casework services, none of which functions sepa-

rately, even though the applicant may begin by using one service in order to find the solution to his particular problem.

When an applicant wishes to avail himself of all the services offered by the center, the caseworker assists him in analyzing his problems and selecting the most urgent aspect or the one for which he is most ready to accept help.

An example illustrates this process. A 65-year-old widow, childless and living alone in her own small home, received only $57 a month in old-age and survivors insurance benefits and was unwilling to apply for supplemental public assistance because of the attendant State requirement of placing a lien on her property. A history of diabetes and a gangrenous condition of both legs made her usual employment as a laundry worker impractical. Her small income was insufficient to cover the cost of medical care, medication, and adequate diet.

In desperation and nearly at the point of coma, she called the center saying that she had heard of its new hospital services. After the center's functions were explained to her, an appointment for an interview was made. She was aided in keeping it and in returning again for medical consultation. Throughout these contacts, although she insisted she really wanted help in finding employment, she was actually asking for help on the basis of what she thought would be acceptable. Finally she accepted medical advice and referral to a hospital for treatment as a first step. The diabetic condition was so acute that immediate hospitalization was arranged.

From the hospital, the woman, with unmistakable relief in her voice, telephoned the center to express appreciation of its services and was assured that after discharge the center would help her to satisfy her needs for social contacts and part-time employment.

Integration of Skills

The importance of integrating the several professional skills in this new program cannot be too greatly emphasized. Periodic staff meetings, case conferences, and sharing of records to which each of the professional disciplines contributes are helping to define the role of each of the disciplines in the program.

It is evident already that a caseworker is essential to the intake process by enabling the applicant to obtain maximum value from the available services in relationship to his physical and psychological status. The psychiatrist evaluates the applicant's capacity to use the program, and advises the center's staff in helping the individual adjust to the group program. The psychologist may participate in diagnosis and evaluation, through the use of psychological procedures, and in vocational exploration with applicants seeking employment. The general medical practitioner helps these older persons to understand their medical problems, recommends treatment where indicated, and advises the staff on appropriate center activities for individuals with health problems. The public health nurse consultant is helpful in giving advice on self-care required to carry out medical recommendations. The physician and psychiatrists will supervise the occupational therapist when such a person is hired.

The representatives of each discipline act as consultants to the director, contributing to a better understanding of the individual and his needs and, where indicated, making recommendations for referral to appropriate resources in the community. In referrals to medical facilities, existing doctor-patient relationships are not disturbed. As the program develops, it is planned that all the professional disciplines will be utilized in both group discussion and group psychotherapy. The director is responsible for administration and coordination of the program.

The system devised for recordkeeping provides essential information about the older person but at the same time keeps paperwork to a minimum. A registration form, a 5-inch by 8-inch card, is used to record significant information about the individual, including age, sex, race, religion, ethnic background, economic status, employment and health history, and the reason he gives for requesting admission to the program. Simple notes about important factors in his situation and his response to the initial casework interview are written by the worker on the reverse side of the card. For individuals who avail themselves of other services, a case folder is set up. Interviews by psychiatrists, physicians, psycholo-

gists, the public health nurse, and caseworkers are recorded in detail and filed in the case folder. Separate weekly individual records are kept by the recreation leaders, giving data on attendance, participation in activities, and some statement about the adjustment of the individual in the group. Most of these records are written in longhand and entries are kept brief or checked under appropriate captions.

Two referral resources are of special interest. The first is the Comprehensive Medicine Clinic, the general medical clinic of Temple University Medical Center. This clinic is staffed by senior medical students, with internists, psychiatrists, and social workers as consulting supervisors and teachers. For the most part, the internists and psychiatrists work as teams and the skills in social work are added wherever indicated. This permits measurements of biological, psychiatric, and sociological parameters in patients as indicated and the application of appropriate and multidisciplined therapies. The Comprehensive Medicine Clinic not only correlates the work of a number of biologically oriented subspecialists but also attempts to understand the patient in his social, psychological, and physiological milieus. The clinic has agreed to accept all individuals referred by the center for inpatient or outpatient care. Fees are on a sliding scale based on the ability of the person to pay. In return, the center has agreed to accept referrals from the clinic of those patients which the clinic's staff feels will benefit from the center program.

The second resource is the Pennsylvania State Employment Service, bureau of employment security, which has agreed to accept referrals of individuals seeking full- or part-time employment. These persons are seen by the older worker specialists in the employment service on an appointment basis for counseling and job placement.

Analyses of Participants

In just under 4 months of operation, 135 applications have been received. Of this number 85 are active participating members, 30 are pending, awaiting intake interviews scheduled but not yet completed, 15 did not keep their appointment for an intake interview, and 5 were not accepted because they required other services not available in the center or because they were too sick to participate in the program.

In the active membership of 85, 39 are men and 46 women. Included are nine married couples. Only three in the active membership are nonwhite. The members range in age from 52 to 86, with the median at 67.7 years. The distribution by religious affiliation shows 40 Protestants, 24 Catholics, and 21 Jews. Forty-one are married, 31 are widowed, 8 are single and 5 are separated. Most have completed 6, 7, or 8 years of schooling; only four have a high school education and one has had some college training. One is illiterate.

Employment histories show that most have had stable employment in skilled or semiskilled occupations while a few were self-employed. Analysis of living arrangements reveals that 42 own their own homes, 20 rent apartments or houses, 16 are living with relatives, and 7 live in roominghouses. Income of the participants is generally limited to OASI benefits but in some cases this is supplemented by small pensions; only five receive public assistance.

Participants reside in all parts of Philadelphia, the majority from outside the immediate area, but recently men and women living in the neighborhood have begun to show an interest in the center's services. Predominantly participants were self-referred as a result of newspaper publicity or were referred by friends. Up to the present time relatively few have been referred by voluntary health and welfare agencies.

Of the 85 active members, 28 have availed themselves of medical consultations, 8 of psychiatric consultation, and 11 of employment counseling. Of the last group, five were referred to the Pennsylvania State Employment Service for job placement for full- or part-time employment. Thirteen have been referred to medical facilities: 10 to the Temple University Comprehensive Medicine Clinic, 1 to another hospital, and 2 to chest X-ray units.

Daily attendance in the group program has been spotty. On some days as many as 30 people attend; on others, just a handful. A variety of factors, some within the center's control and

others not, appear to account for this. These factors include long travel distance to the center, carfare expense, inclement weather, seasonal illness, morning schedule, location of the center in an area where people are disinclined to use public services, shortage of equipment and supplies, lack of a lunch program, and certain limitations of the building which, though modern and spacious, needs furnishings to give greater warmth and comfort. However, there is every indication that daily attendance will increase as these problems are resolved.

Planned Research

Implicit in this pilot project is the hypothesis that meeting some of an individual's basic needs will result in improved physical and mental health, or at least the prevention of deterioration. Experience and observation already evidence some improvement in the adjustment of those participating in the program, but these subjective judgments need to be supported by more objective evidence.

A study is being planned to test the effectiveness of the program in facilitating the individual's adjustment; this will be undertaken as soon as the program stabilizes. The basic research design will consider three factors: (*a*) an appraisal of the individual's background, needs, capacities, attitudes, skills, and physical and mental status before entering the program; (*b*) an analysis of his participation in the program, stressing the manner in which he performs and relates to others and the reactions of staff and other participants to him; and (*c*) an analysis and evaluation of the changes that have taken place in his behavior, health, and adjustment after a period of time in the program, such as 6 months or 1 year. Such a study may indicate whether the improvement in the older person comes from the use of former adjustive behavior patterns or by the development of new ones.

It is important to determine whether the improvement is real or superficial and to what extent it is due to relief from loneliness, to an active and regular regimen, or to other factors. It is also important to know what factors motivate individuals to take part in one activity rather than another, what needs are being met by a particular activity or by the program as a whole, how effective the program is in meeting needs, and how the program can be improved.

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PHS Grants for Public Health Schools

The Nation's 11 schools of public health were awarded training grants totaling $450,000 in the last half of fiscal year 1959 to help overcome a national deficit in trained health personnel. A $1 million grant fund for the same purpose has been awarded for fiscal year 1960. Legislation authorizing such aid by the Public Health Service was passed in 1958, but no funds were available until a supplemental appropriation was voted in May 1959.

The funds will help the schools extend and improve specialty training in public health for physicians, nurses, engineers, and other personnel employed in Federal, State, and local public health agencies in the United States and in foreign health agencies.

Stingray Injuries

FINDLAY E. RUSSELL, M.D.

INJURIES inflicted by stingrays are common in several areas of the coastal waters of North America (*1–4*). Approximately 750 people a year along our coasts are stung by these elasmobranchs. The largest number of stings are reported from southern California, the Gulf of California, the Gulf of Mexico, and the south Atlantic coast (*5*).

Of 1,097 stingray injuries reported over a 5-year period in the United States (*5*, *6*), 232 were seen by a physician at some time during the course of the recovery of the victim. Sixty-two patients were hospitalized; the majority of these required surgical closure of their wounds or treatment for secondary infection, or both. At least 10 of the 62 victims were hospitalized for treatment for overexuberant first aid care. Only eight patients were hospitalized for the treatment of the systemic effects produced by the venom. There were two fatalities.

Considerable care should be exercised when wading in shallow waters known to be inhabited by stingrays. Stingray injuries usually occur when the unwary victim treads upon the fish while wading in the ocean surf or mud flats of a bay, slough, or river. The fish often buries itself in the sandy or muddy bottom and may remain motionless until stepped upon. The pressure of the foot on the dorsum of the fish provokes him to thrust his tail upward and forward, driving his sting into the foot or leg of the victim. As the sting enters the flesh, the integumentary sheath surrounding the spine is ruptured and the venom escapes into the victim's tissues. In withdrawing the spine, the integumentary sheath may be torn free and remain in the wound.

Unlike the injuries inflicted by many venomous animals, wounds produced by the stingray may be large and severely lacerated, requiring extensive debridement and surgical closure. A sting no wider than 5 mm. may produce a wound 3.5 cm. long (*6*), and larger stings may produce wounds 7 inches long (*7*). Occasionally, the sting itself may be broken off in the wound.

The sting, or caudal spine, is a bilaterally serrated dentinal structure located on the dorsal surface of the animal's tail. The sharp serrations are curved cephalically and as such are responsible for the lacerating effects as the sting is withdrawn from the victim's flesh. The location, size, and number of stings vary with the species, habitat, and age of the fish. The round stingray, now designated as *Urolophus halleri*, which is implicated in the majority of injuries along the southern California coast, has one or more stings of 1.6 to 5.9 cm. long (*8*). The giant stingray of Australia, *Bathytoshia*, may possess a caudal spine of 42.0 cm. long (*9*).

The greatest portion of venom is contained within the two ventrolateral grooves of the sting. In the untraumatized state, the sting is incased in an integumentary sheath. The anatomic relationships of the sheath and sting have been described elsewhere (*10–12*).

Chemical and Zootoxicological Properties

The toxic fractions of the venom are soluble proteins of average molecular weight. They

Dr. Russell is director of the laboratory of neurological research of the College of Medical Evangelists and Los Angeles County Hospital. *Basic data in the report were obtained from studies supported by the Office of Naval Research, Dazian Foundation for Medical Research, and the Public Health Service.*

are extremely labile and rapidly inactivated by heating. Ten amino acids have been identified in the venom. The total nitrogen, carbohydrate, and protein for 100 mg. of the venom has been calculated as 3.1 mg., 3.3 mg., and 24.9 mg. respectively. The intravenous LD_{50} of the lyophilized venom is estimated at 28.0 mg./kg. of body weight (*13*).

In addition to the local effects (*12*), the venom produces changes in the cardiovascular, respiratory, nervous, and urinary systems (*5*, *14*, *15*). Low concentrations of the toxin give rise to simple, transient peripheral vasodilatation or vasoconstriction. The most consistent change in the electrocardiographic pattern of cats when small amounts of the venom are injected is bradycardia with an increase in the PR interval, giving a first degree atrioventricular block with but slight change in the blood pressure. Reversal of the small dose effect occurs within 30 seconds following the end of the injection (*14*, *15*).

Larger amounts produce constriction of the arteries and veins as well as the arterioles, and second or third degree atrioventricular block. The second degree block is usually followed by sinus arrest. In addition to the PR interval change, ST, T wave changes indicative of ischemia and, in some animals, true muscle injury are seen (*15*, *16*). Concomitant with these changes is a fall in systemic arterial pressure. It is apparent that the venom affects the normal pacemaker of the heart. Most of the cardiovascular changes revert to normal within 24 hours (*5*).

Lethal amounts of the venom cause marked vasoconstriction and cardiac standstill of varying durations. All degrees of atrioventricular block as well as defects in intraventricular conduction occur, and if death is not immediate, the rhythm of the normal pacemaker is replaced by one elaborated outside the sino-atrial node. The blood pressure falls rapidly, and the animal dies in complete cardiovascular collapse (*5*,*14*,*15*). Concomitant with these changes are alterations in the respiratory and central nervous systems (*5*,*13*). The venom has no effect on neuromuscular conduction (*17*). Postmortem examination of animals which have survived for 4 days following a lethal dose of the venom show few gross changes. However, pulmonary edema, engorgement of the liver sinusoids, and vascular congestion with tubular epithelial necrosis in the loop of Henle are seen (*13*).

Diagnosis

Persons stung by stingrays report having received a sharp, painful stab, usually in the foot or leg, while swimming or wading in an area where these animals are present. The pain is usually described as intense or excruciating; it increases in severity during the first 90 minutes following the stinging if treatment is not instituted. The pain is out of proportion to that which might be produced by a nonvenomous fish or by stepping upon a broken bottle or bivalve. "Stingings" by broken bottles are a common occurrence along certain of our coasts, according to the lifeguard services.

Examination reveals either a puncture or a lacerating wound, usually the latter, jagged, bleeding freely, and often contaminated with parts of the stingray's integumentary sheath. The edges of the wound may be discolored, though the discoloration is not usually marked immediately following the injury. However, within 2 hours the discoloration may extend several centimeters from the wound. Subsequent necrosis of this area is not uncommon in untreated cases.

Edema is a constant finding following stingings by these animals. The edema is not as severe as one sees following a rattlesnake bite, but it may persist for several weeks in the untreated case. Syncope, weakness, nausea, nervousness, and sweating are common complaints. Vomiting, diarrhea, tremors, general-

The round stingray Urolophus halleri

An Early Case History

An early stingray victim was Captain John Smith. Walter Russell, "Gentleman, doctor of physicke," who accompanied Smith as he explored Chesapeake Bay in June 1608, described the encounter in chapter 5, "The Accidents that hapned in the Discovery of the Bay of Chisapeack" of The Third Booke of The Proceedings and Accidents of the English Colony in Virginia.

. . . Having finished this discovery (though our victuall was neere spent) he intended to see his imprisonment-acquaintances upon the river of *Rapahanock*, by many called *Toppahanock*, but our bote by reason of the ebbe, chansing to grownd upon a many shoules lying in the entrances, we spyed many fishes lurking in the reedes: our Captaine sporting himselfe by nayling them to the grownd with his sword, set us all a fishing in that manner: thus we tooke more in owne houre then we could eate in a day.

But it chansed our Captaine taking a fish from his sword (not knowing her condition) being much of the fashion of a Thornback. but a long tayle like a ryding rodde, whereon the middest is a most poysoned sting, of two or three inches long, bearded like a saw on each side, which she strucke into the wrest of his arme neere an inch and a halfe: no bloud nor wound was seene, but a little blew spot, but the torment was instantly so extreme, that in foure houres had so swolen his hand, arme and shoulder, we all with much sorrow concluded his funerall, and prepared his grave in an Island by, as himselfe directed: yet it pleased God by a precious oyle Doctor Russell at the first applyed to it when he sounded it with probe, (ere night) his tormenting paine was so well asswaged that he eate of the fish to his supper, which gave no lesse joy and content to us then ease to himselfe. For which we called the island *Stingray* Isle after the name of the fish. . . .

ized cramps, inguinal or axillary pain, and respiratory distress are less frequently reported. Arrhythmias, paresthesias, and convulsions may occur. True paralysis is extremely rare, if it occurs at all. The "paralyses" seen by the author following severe stingings were contractures, probably initiated as flexion reflexes stimulated by the intense pain. These contractures were relieved with meperidine hydrochloride.

Treatment

The standard procedure for treatment of stingray injuries is well established (*5*). As the chief complaint is immediate, intense, localized pain, the treatment will be most successful if the victim initiates it. Injuries to an extremity should be irrigated with the salt water at hand, since much of the venom can be washed from the wound by this step. An attempt should be made to remove the integumentary sheath if it can be seen in the wound. If a properly qualified person is available, he may apply a constriction band directly above the wound site. The extremity should then be submerged in hot water at as high a temperature as the patient can tolerate without injury for 30 to 90 minutes. The addition of sodium chloride or magnesium sulfate to the hot water is optional.

In many areas of the United States the lifeguard services provide the first aid care just described, and the victim usually arrives at the hospital emergency room or physician's office in little acute pain and with few, if any, other complaints. The wound should then be further examined for evidence of the integumentary sheath, debrided, sutured if necessary, and the appropriate antitetanus agents administered. While infections of these wounds are rare in properly treated cases, some physicians routinely give antibiotics. Elevation of the injured extremity is advised.

Irrigation is contraindicated if the sting has entered the abdominal or thoracic cavity, and the patient should be hospitalized. In such cases, the patient should be explored surgically

for the presence of the ray's integumentary sheath (*5*). Exploration is indicated if the sting has pierced the peritoneum or pleura. Such exploration may require considerable time, since the sheath may be torn into several small pieces. The venom is rapidly absorbed in the peritoneal cavity, and should the offending ray be a large one, the prognosis is poor in the presence of an unremoved sheath. It is also possible for the toxin to be expressed from the venom apparatus without the sheath being left in the wound.

In severe stings, which provoke systemic symptoms, the victim should also be hospitalized. The primary shock often seen immediately following these injuries usually responds to simple supportive measures. If secondary shock develops as a result of the direct effects of the venom, the physician must direct his efforts toward maintaining cardiovascular and respiratory tone. Oxygen should always be given. Meperidine hydrochloride has been found to be effective in controlling the pain (*5, 6*). Experiments with mice have shown that the drug does not alter the LD_{50} of the venom (*5*).

Summary

Injuries inflicted by stingrays are common in several areas of the coastal waters of North America. Approximately 750 people a year along our coasts are stung by these elasmobranchs. About 20 percent of those injured are seen by a physician some time during the course of their recovery; 6 percent are hospitalized.

In the untraumatized state, the sting is encased in an integumentary sheath. The greatest portion of the venom is contained within the ventrolateral grooves of the sting.

The toxic fractions of the venom are soluble proteins of average molecular weight which are extremely labile and rapidly inactivated by heating. While the venom produces changes in the respiratory and central nervous systems, its principal action is on the cardiovascular system.

The chief complaint following a sting by one of these animals is severe pain. Syncope, weakness, nausea, nervousness, and sweating are common complaints. Vomiting, diarrhea, tremors, generalized cramps, inguinal or axillary pain, and respiratory distress are less frequently reported. Arrhythmias, parasthesias, and convulsions may occur.

Treatment is aimed toward alleviating the pain, preventing complications that may be evoked by the venom, and preventing secondary infections. The following therapy is suggested. Irrigate the wound thoroughly, removing the animal's integumentary sheath if present. Apply a constriction band directly above the wound site until hot water can be prepared. Soak affected part in hot water for 30 to 90 minutes. Debride and close wound as necessary. Administer appropriate antitetanus agent and antibiotic. Keep affected part elevated.

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films

The Innocent Party

16-mm. film, color, sound, 17 minutes, 1959.

Audience: Students, parents, educators, civic groups, health workers, and the general public.

This film, depicting the problems of teenagers with venereal diseases, documents simply, forthrightly, and in good taste the nature, recognition, cure, and control of syphilis.

Suitable for mixed audiences, it was shown before release to groups of parents, teachers, educators, Catholic and Protestant clergy, public health officials, and teenagers.

The film was produced by the Kansas State Board of Health in cooperation with the Public Health Service. It may be borrowed from the film library of the Communicable Disease Center, Atlanta, Ga., by high schools, colleges, youth organizations, and civic groups, as well as health departments, and will be offered for sale by an independent contractor.

Information concerning loan or purchase may be obtained from Dr. William J. Brown, Chief, Venereal Disease Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga.

George Washington's River

16-mm. film, color, sound, original music, 28 minutes, cleared for television, 1959.

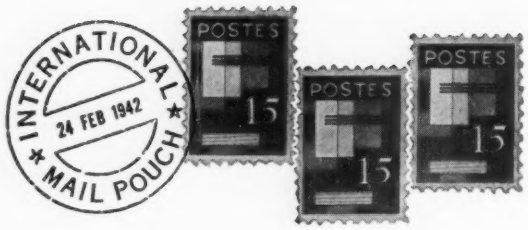
Audience: Sanitarians, persons interested in conserving natural resources, and the general public.

From a depiction of George Washington's time when he built his home at Mount Vernon "on the finest river in the world," this new water pollution film takes the audience to present-day scenes of the polluted Potomac. The ugliness of the pollution emanating from the metropolitan area is contrasted with the fresh, clear headwaters of the Potomac. Scenes include national shrines, cherry blossom time at the Tidal Basin, and a long-forgotten bathing beach in Washington.

The film shows how cities and industries can manage their wastes and restore the streams for fishing, boating, swimming, and domestic and industrial requirements.

Film libraries or agencies considering the purchase of a print can obtain a preview copy from the Division of Water Pollution Control, Public Health Service, Washington 25, D.C. Distribution for public showings will be made from film service libraries only.

Prints can be purchased, at $95.42 each postpaid, from the Motion Picture Service, Office of Information, U.S. Department of Agriculture, Washington 25, D.C.



Medical Center

A national medical center for Korea opened October 2, 1958, in Seoul. The largest modern medical facility in the Far East, the center has 465 beds and was financed with $2.4 million from UNKRA funds and $2 million contributed by Norway, Sweden, and Denmark. For its first 5 years of operation the center will have approximately 80 Scandinavian staff members, supported by an annual $1.5 million contribution from the three countries. The entire facility will be turned over to Korea in 1963.

—ALFRED S. LAZARUS, *chief, Health and Sanitation Division, U.S. Operations Mission, Korea.*

Ojos de Agua

The Ministries of Agriculture, Education, and Health joined forces in a new rural development at Ojos de Agua, a small community in southeastern El Salvador. An earth-cement brick-making machine, used here for the first time, manufactures bricks for a new school, houses, and water supply units. The water units consist of laundries, showers, drinking fountains, watering troughs for animals, and food-washing vats. The community is building approved latrines for each of 420 houses.

—LAMAR A. BYERS and W. C. JAMES, *chief and acting chief, Health and Sanitation Division, U.S. Operations Mission, El Salvador.*

The Well Diggers

Twelve thousand new or rehabilitated wells will be put into operation in East Pakistan this year. The wells will provide a safe source of water. Villagers customarily use open tanks for bathing and laundering as well as for drinking water.

The government of East Pakistan has contracted with 220 small contractors, each with 2 or 3 crews of 4-man gangs, to dig new tube wells or put clogged wells back into service. Most of the wells are less than 200 feet deep. In the Dacca area, 2,294 out of the scheduled 3,370 wells were finished in 30 days.

The village water supply project required nearly 350 miles of 1½-inch galvanized iron pipe, 10,000 hand pumps, 1,000 deep-well hand pumps, and quantities of pipe fittings, strainers, well points, spare parts for the clogged wells, and hand tools.

—ANTHONY DONOVAN, M.D., *chief public health adviser physician, U.S. Operations Mission, Pakistan.*

Tuberculosis in Israel

The number of tuberculosis cases in Israel has dropped so that 750 beds are sufficient for hospitalized tuberculous patients. Other tuberculosis facilities have been converted into general wards, homes for the aged, and mental hospitals.

Ten years ago, when 1,000 immigrants were arriving daily, 12 out of 1,000 had signs of the disease.

Through efforts of the Ministry of Health, trade unions' sick funds, and philanthropic organizations, the number of beds for tuberculosis patients increased from 348 in 1948 to 2,200 by 1953.

Malben, a philanthropic organization, took on the task of rehabilitating discharged patients, totaling 7,000 in 1958 alone.

Malaria in Southeast Asia

To coordinate malaria eradication, 40 officers and technicians from Laos and Thailand met at a border conference at Nongkhai, Thailand, February 2–6, 1959. In 1959 eradication efforts will serve 14 million Thai and 700,000 Lao, an increase of 2 million persons in Thailand and 300,00 in Laos.

In large areas of Thailand the malaria eradication program is almost complete, and less than half of the operational areas require spraying this year. Laos will continue spraying in all operational areas and start surveillance activities in areas of 175,000 population.

—MELVIN E. GRIFFITH, *acting chief, public health division, U.S. Operations Mission, Thailand.*

Hospital Use in Hagerstown

MARGARET D. WEST and RUTH M. RAUP

DURING RECENT DECADES, many changes have taken place in patterns of medical care. Besides new methods of preventing and treating illness and disability, new forms of organizing and financing medical and hospital care have emerged making possible more efficient provision of services and a lighter burden of medical care costs for some individuals. Changes in the character of the population, such as the increase in the proportion of older persons, have altered the relative importance of certain diseases and injuries. What has been the effect of these and other changed conditions on the utilization of hospital care?

Since the early 1920's the Public Health Service has conducted a series of studies on the health status in Hagerstown, Md., a small city selected as representative in demographic characteristics of communities in the eastern United States. Among these studies have been household morbidity surveys, the first conducted in the period 1921–24 (*1*) and the latest during 1955–57 (*2*).

The 1955–57 survey showed that most of the hospital care of the surveyed population was provided in the Washington County Hospital in Hagerstown. The same hospital provided most of the hospital care for residents of the area in 1921–24. Because this hospital maintains an excellent index of patient discharges covering both the earlier and the later survey periods, a valuable opportunity was presented for comparison of the city's rates and patterns of hospitalization over an interval of about 35 years.

Methods

Information on hospitalization in the 1921–24 and 1955–57 surveys was collected by checking the name of each individual in the survey against the discharge records of the Washington County Hospital for the period of his inclusion in the survey. The population surveyed in 1921–24 numbered 9,946 individuals, representing about one-third of the city's total population at that time (28,064 in the 1920 census). The group in 1955–57, about one-twentieth of the total population of 36,260 in the 1950 census, was made up of 1,868 individuals, including 22 who died during the survey period.

As a basis for computing hospitalization rates, the number of individuals surveyed was multiplied by the period of coverage of the individuals to give the total person-years of experience on which information was obtained. In the 1921–24 survey, the total number of person-years of experience reported on was 18,790. Person-years in the more recent survey totaled 2,935, with about half of the individuals covered for 1 year and most of the rest for 2 years.

Both the 1921–24 and 1955–57 survey populations were generally representative of the total Hagerstown population in sex and age distribution, as reported in the 1920 and 1950 censuses. The earlier sample was picked by interviewing all households in sections of the city which represented different economic classes. The 1955–57 sample was drawn at random from households listed in the Hagerstown city directory. Only white households were included in the 1921–24 survey, whereas about 3 percent of the persons surveyed in 1955–57 were Negroes.

Mrs. West is chief of the Health Service Requirements Branch, and Miss Raup, public health research analyst, in the Division of Public Health Methods, Public Health Service.

Hospital Use

Over the past 35 years, patterns of hospitalization in Hagerstown as reflected in use of the Washington County Hospital by the 1921–24 and 1955–57 surveyed populations have changed markedly. Perhaps the most striking change is the increase in hospital admissions and in total days of hospitalization per year.

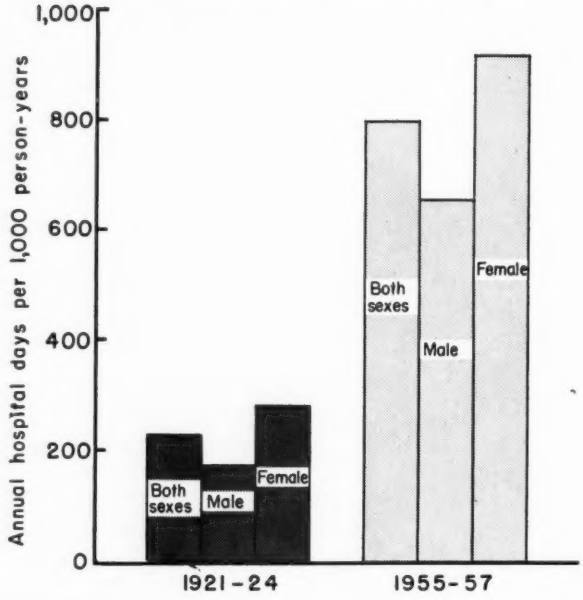
Hospital admissions among the 1955–57 surveyed population occurred at a rate about 5½ times that for the 1921–24 group—105 per 1,000 person-years as compared with 18 per 1,000. Among females, who in both surveys had higher admission rates than males, the size of the increase was even greater—from 21 per 1,000 to 134 per 1,000, or a growth of more than 6 times. Admission rates among men increased about 4¾ times, from 15 per 1,000 to 71 per 1,000.

Patients in the more recent period tended to stay for shorter periods than did those admitted 35 years earlier. Whereas in the 1921–24 survey the average length of stay was 12.5 days, by 1955–57 the average had dropped to 7.6 days, a decrease of well over one-third. The decrease was particularly marked among females, whose average stay dropped from 13.2 to 6.9 days. Among males the decrease was proportionately smaller, from 11.5 to 9.2 days.

These decreases, however, only partly offset the increase in admissions in total effect on hospital days per year. So great was the increase in admissions that, despite the one-third decrease in average length of stay, total annual days of hospitalization received by the 1955–57 surveyed population exceeded by more than three times, relatively, the days of care received by the 1921–24 group. As shown in figure 1, the rate increased from 228 days per 1,000 person-years in the earlier period to 797 days in the latter. Among males the rate increased about 3¾ times as compared with a 3⅓ increase in the rate for females.

Only a small part of the increase in hospitalization can be explained by a growth in the proportion of persons admitted more than once during a given year. The number of different individuals hospitalized increased from 17.3 per 1,000 persons to 91.3 per 1,000, or almost as much as the hospital admission rates. The increase in repeated hospitalizations was somewhat greater among females than among males.

Figure 1. Annual hospital days per 1,000 person-years for populations surveyed in Hagerstown, Md., 1921–24 and 1955–57, by sex



Hospitalization rates based on records of the Washington County Hospital slightly understate total hospital use to the extent that in both 1921–24 and 1955–57 certain members of the surveyed populations received all or part of their hospital care in hospitals outside Hagerstown. In the later period, as determined from interview replies, total admission rates, including "outside" hospitalizations, were about 10 percent higher than admission rates for the Washington County Hospital alone. There was some tendency for persons going to "outside" hospitals to stay for longer periods, raising the average length of stay from 7.6 days for Washington County Hospital admissions to 8.2 for all hospitalizations. Although it has not been possible to get similar detail on outside hospitalizations among the 1921–24 population, W. C. Dando, assistant to the administrator of the hospital, is of the opinion that the proportion so receiving care has not changed significantly in the past 35 years.

Variations by Age

Increases in hospitalization rates were found in all age groups, although the size of the increase was greater for some groups than for others. The largest increases both in admis-

Table 1. Hospital admissions per 1,000 person-years of experience of populations surveyed in Hagerstown, Md., 1921–24 and 1955–57, by age group

Age group (years)	1921–24	1955–57	Times increased
Total	18	105	5.8
Under 5	9	67	7.4
5–14	21	58	2.8
15–24	23	115	5.0
25–44	21	139	6.6
45–64	19	87	4.6
65 and over	10	134	13.4

sions and in annual hospital days occurred among the youngest and the oldest age groups (table 1, fig. 2). Among children under 5 years, admission rates increased 7 times and annual days 10 times, while the comparable increases for persons 65 years old and over were 13 and 12 times. Each of the intervening age groups, however, also showed increases in hospital care.

Among the intervening age groups, increases in admissions tended to exceed increases in total days of care per year. Whereas admission rates rose by amounts ranging from just under three to almost seven times, total days of care in no case increased more than 2 to 2½ times. The differential between the increase in admissions and the increase in days of care was greatest among persons 15–24 and 25–44 years old, and least among children 5–14 years of age. These differences reflect variations by age in the extent of change in average length of stay.

Although the average stay for the total survey groups declined about one-third, it decreased as much as two-thirds among persons 25–44 years old (fig. 3). Other age groups experiencing a marked decline were the 15–24 and 45–64. Relatively little change occurred in the shorter average stays of children under 15 or in the longer average stays of persons 65 and over. The small increase in stay among children under 5 can be explained at least in part by a decrease in the share of the caseload admitted for short-stay tonsillectomies.

Figure 2. Annual hospital days per 1,000 person-years for populations surveyed in Hagerstown, Md., 1921–24 and 1955–57, by age

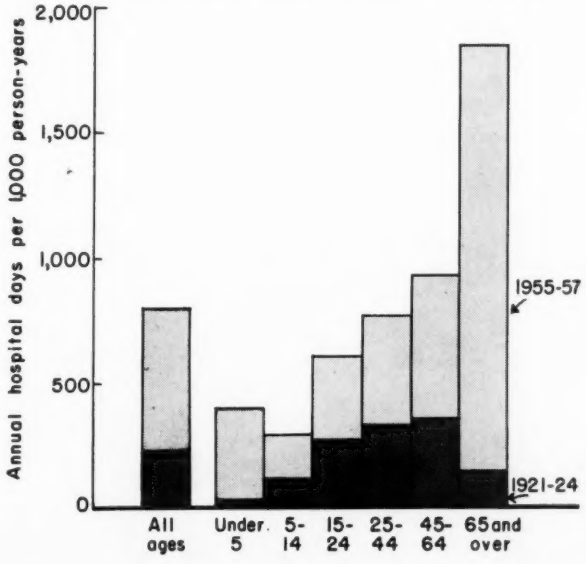
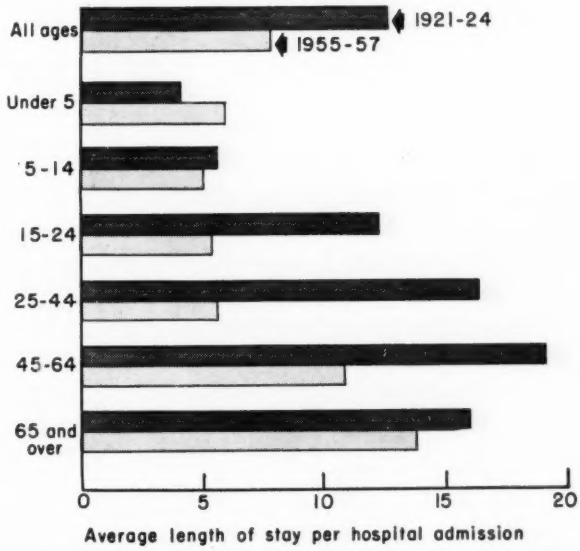


Figure 3. Average length of stay per hospital admission for populations surveyed in Hagerstown, Md., 1921–24 and 1955–57, by age



Over the past 35 years the proportion of the Hagerstown population in the age groups having the highest hospitalization rates has increased. Between 1921–24 and 1955–57, the proportion of the surveyed population 65 years old or over doubled, rising from one-twentieth to one-tenth. There was an increase also in the second oldest group, 45–64, from about one-sixth to almost one-quarter of the total. The increase in hospitalization rates was sufficiently general among all age groups, however, that the

Table 2. Hospitalization rates [1] among surveyed populations in Hagerstown, Md., with adjustment for change in age composition of population, 1921–24 and 1955–57

Hospitalization	1921–24 surveyed population	1955–57 surveyed population	
		Actual	Age adjusted [2]
Annual days of care	228. 4	796. 9	668. 1
Admissions	18. 2	104. 6	99. 6
Persons hospitalized	17. 3	91. 3	86. 0

[1] Per 1,000 person-years.
[2] Rates expected if population with 1921–24 age composition had been hospitalized at 1955–57 age-specific rates.

increase in age of the 1955–57 population accounts for only a small part of the overall increase in hospitalization. Even if the age composition of the population had stayed constant, as in table 2, annual hospital days relative to population still would have increased almost three times, hospital admission rates about five times, and persons hospitalized more than four times.

Diagnosis

It might be expected that a few outstanding diagnoses or diagnostic groups would account for most of the increase in hospitalization between the 1921–24 and 1955–57 survey periods. Actually there were increases in care, in terms of annual days of hospitalization or hospital admission rates, for practically every diagnosis or diagnostic group studied. This is shown in some detail in figure 4 and table 3.

The diagnostic groups showing the largest proportionate increases in hospitalization were circulatory diseases (including heart), genito-urinary disorders, neoplasms, and deliveries. Such other categories as respiratory diseases, diseases of the digestive system, and accidents, however, also accounted for substantial increases in care. The only diagnostic group having a decrease in annual days of care was infectious and parasitic diseases, and this was surprisingly small.

Hospitalization rates for specific diseases or conditions within the diagnostic groups, although based on small numbers of cases, provide similar evidence of a general growth in hospital use. Between the earlier and the later survey periods, only three diseases listed—tuberculosis, typhoid, and mastoiditis—disappeared as causes of hospitalization in this general hospital. Rates of care for appendicitis, tonsillectomies, and arthritis and rheumatism remained about the same or dropped somewhat. For all other diagnoses listed, hospital admissions and annual days of care increased by amounts ranging from twice to more than 50 times. Even pneumonia accounted for 2½ times as many admissions and annual days in 1955–57 as in 1921–24.

Increased hospitalization for the delivery of babies accounts for a significant part of the increase in hospital use among women of childbearing age. In the 1921–24 surveyed population, women 15–44 years old were ad-

Figure 4. Annual hospital days per 1,000 person-years for populations surveyed in Hagerstown, Md., 1921–24 and 1955–57, by diagnosis

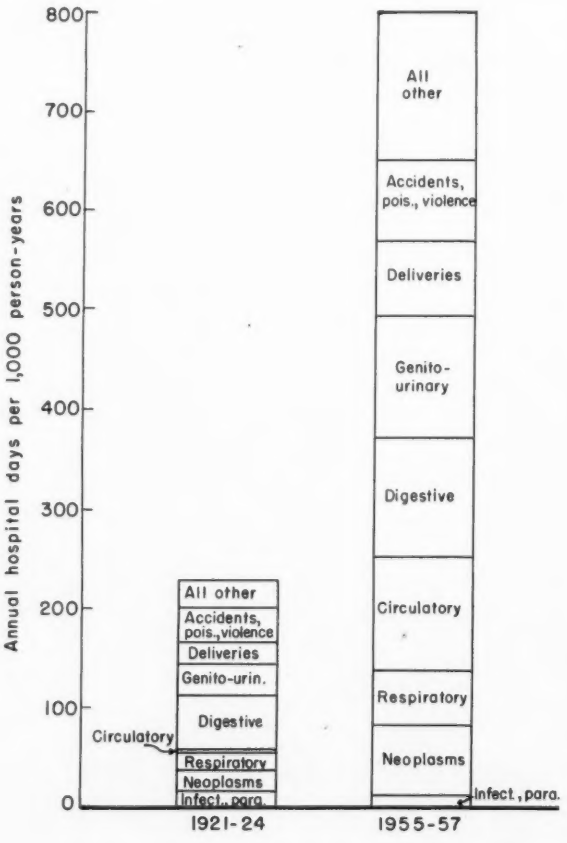


Table 3. Hospitalization rates by diagnosis, surveyed population in Hagerstown, Md., 1921–24 and 1955–57

Diagnosis	Hospital admissions per 1,000 person-years		Annual days in hospital per 1,000 person-years	
	1921–24	1955–57	1921–24	1955–57
Total	342	307	4, 292	2, 339
Total rate per 1,000	18. 2	104. 6	228. 4	796. 9
Infectious and parastic diseases	. 6	1. 4	15. 9	10. 9
Tuberculosis	. 2	0	2. 4	0
Typhoid	. 3	0	12. 9	0
Other	. 1	1. 4	. 6	10.
Neoplasms, malignant and benign	1. 0	6. 8	21. 2	71. 2
Respiratory diseases	5. 0	9. 5	19. 4	55. 2
Pneumonia	. 5	1. 4	6. 6	16. 0
Tonsils and adenoids	3. 9	4. 4	5. 2	6. 5
Other	. 6	3. 7	7. 6	32. 7
Circulatory diseases	. 2	9. 2	2. 6	113. 5
Heart	. 2	5. 5	2. 0	80. 5
Other	[1]	3. 7	. 6	33. 0
Digestive diseases	3. 2	13. 3	52. 3	121. 6
Ulcer and other stomach and duodenum diseases	. 2	2. 4	1. 1	22. 1
Hernia	. 3	1. 7	3. 7	12. 3
Gallbladder and bile ducts	. 4	3. 1	6. 4	23. 9
Appendicitis	1. 9	2. 0	32. 5	23. 5
Other	. 4	4. 1	8. 7	39. 9
Genitourinary diseases	1. 9	19. 1	31. 6	121. 3
Kidney and urinary system	. 4	7. 5	5. 3	43. 3
Male genital	[2] . 3	[2] 2. 0	[2] 3. 1	[2] 24. 5
Female genital	[2] 1. 2	[2] 9. 6	[2] 23. 2	[2] 53. 5
Deliveries	[2] 2. 4	[2] 16. 0	[2] 21. 3	[2] 75. 0
Accidents, poisonings, violence	1. 6	5. 8	36. 0	82. 1
Other	2. 3	23. 5	28. 0	146. 2
Diabetes and other endocrine, nutrition, and metabolic diseases	. 1	3. 1	1. 6	32. 0
Psychoneuroses and personality disorders	. 1	3. 1	. 7	16. 4
Vascular lesions and other diseases of the central nervous system	. 1	1. 7	. 6	13. 3
Diseases of ear and mastoid	. 4	0	3. 5	0
Arthritis, rheumatism, other musculoskeletal diseases	. 5	1. 0	11. 8	9. 5
Complications of pregnancy and puerperium	. 7	6. 1	6. 3	24. 9
All other	. 4	8. 5	3. 5	50. 1

[1] Less than 0.05.
[2] Rate in relation to total person-years of experience.

mitted to the Washington County Hospital for deliveries at a rate of 7.2 per 1,000; in the 1955–57 population the comparable rate was 71.3 per 1,000, or about 10 times as great. Annual days of hospital care for deliveries increased at a somewhat lesser rate, reflecting an almost two-thirds decrease (from 12.9 to 4.7 days) in the average length of stay for delivery cases.

Birth statistics for the whole of Washington County support the hypothesis that the increase in delivery cases among the surveyed populations was related to a trend toward hospitalization for deliveries rather than to some other factor such as an increase in the birth rate. Between 1921 and 1956 the birth rate in Washington County scarcely changed; actually it decreased slightly. At the same

Table 4. Hospitalization rates [1] for women of childbearing age, compared with rates for men in same age groups, surveyed populations in Hagerstown, Md., 1921–24 and 1955-57

Hospitalization, by sex	1921–24	1955–57	Times increased
Admissions			
Females 15–44 years:			
Including deliveries	28. 7	201. 8	7. 0
Excluding deliveries	21. 7	130. 5	6. 0
Males 15–44 years	13. 4	52. 5	3. 9
Annual days in hospital			
Females 15–44 years:			
Including deliveries	416	1, 058	2. 5
Excluding deliveries	326	724	2. 2
Males 15–44 years	204	349	1. 7

[1] Per 1,000 person-years.

time, in the second half of this period alone, the proportion of all Washington County births occurring in a hospital increased about fourfold, rising from 26 percent in 1940 to 97 percent in 1956.

Even among women of childbearing age, however, the trend toward hospitalization for deliveries can be only one of a number of factors explaining the increase in hospital use. If we recompute the admission rates and annual days of care of women in this age group so as to exclude delivery cases, as shown in table 4, we find that over the past 35 years hospitalization for causes excluding deliveries increased almost as much as did hospitalization including deliveries. In both 1921–24 and 1955–57, moreover, women 15–44 years old were hospitalized at rates well above those of men in the same age category, whether or not deliveries are included.

Illness and Death Rates

Changes in hospitalization patterns can be expected to be related in part to changes in patterns of morbidity and mortality in the community. In Hagerstown, the incidence of certain chronic diseases is reported to have risen. There have been increases also in the proportion of persons dying from chronic illnesses and in the proportion of people dying in the hospital.

Because both the 1921–24 and the 1955–57 surveys had as their primary objective the measurement of illness rates, it is possible to compare changes in hospitalization rates with changes in reported sickness rates, at least for selected chronic conditions. Among the illnesses compared, the most common pattern of change was one of increase in both hospitalization and illness rates but the increase in hospitalization was greater. Thus the rate at which heart disease was reported in 1955–57 was approximately twice that for 1921–24, but during the same period hospital admissions and annual hospital days for this diagnosis rose 25 and 40 times respectively.

Evidence of change in causes of death in Hagerstown is found in death reports for the whole of Washington County in the years 1922 and 1956. Although the resident death rate for all causes showed only a slight decline (from 11.6 to 10.0 per 1,000 population), there was a noticeable shift from acute toward chronic illness in the cause of death, as shown in table 5. Infant death rates also were down by about two-thirds. Although information on deaths in other age groups is not available for years as early as 1922, between 1930 and 1956 alone the proportion of total deaths occurring among persons under 15 years of age declined from 15 to 8 percent, and the proportion among persons 45 years and over increased from 67 to 84 percent.

Deaths in the hospital in Hagerstown have increased in relation to total population although they have decreased in relation to the number of admissions to the hospital. In

Table 5. Resident death rates in Washington County, Md., by selected cause, 1922 and 1956

Cause	1922	1956
Deaths per 1,000 population	11. 6	10. 0
Typhoid and diphtheria	. 2	0
Diarrhea and enteritis	. 7	0
Pneumonia and influenza	1. 0	. 2
Disease of early infancy	. 8	. 4
Cancer	. 9	1. 5
Diseases of the heart	2. 0	4. 4
All other	6. 0	3. 5
Infant deaths per 1,000 live births	85. 4	29. 0

SOURCE: Maryland State Health Department.

1955–56 there were 6.7 deaths in Washington County Hospital for every 1,000 residents of the county, compared with 2.5 per 1,000 in 1922–23, or an increase of about 2½ times over the earlier period. As a proportion of total deaths among county residents, Washington County Hospital deaths rose from 10 percent in 1922–23 to 37 percent in 1955–56. The number of deaths per 1,000 episodes of hospitalization fell by about one-third (from 47.2 to 30.7 per 1,000) in connection with the large increase in hospitalizations that did not terminate in death.

Physician Supply

While hospitalization rates among the surveyed populations increased between 1921–24 and 1955–57, the relative supply of physicians remained about the same. The actual number of physicians in Washington County increased by about one-third, from 59 in 1923 to 82 in 1956, but this increase did little more than keep pace with the increase in the population during the period. The ratio of physicians to population scarcely changed, rising from 99 per 100,000 in 1923 to 104 per 100,000 in 1956. If the comparison is limited to physicians in private practice, the ratio is 99 per 100,000 in both periods. Any increase between 1923 and 1956 was almost entirely confined to physicians in public health, industrial medicine, and other positions distinct from private practice.

Most physicians in Hagerstown reportedly see more patients in a day or week today than they did some years ago. Not many of them work longer hours; on the contrary, most of them are said to have more real free time. Rather, the organization of practice has changed. More patients are seen in the office or at the hospital, and fewer in their homes. Where home calls are required, transportation is less of a problem. Also, according to Dr. E. F. Poole, the secretary of the Washington County Medical Society, there is more cooperation among physicians, whether informally or through partnerships or other organized arrangements, thus making services more readily available when needed.

Medical practice in Hagerstown resembles that in other parts of the Nation in that it has become increasingly specialized since the 1920's.

Table 6. Physicians in Washington County, Md., by type of practice and specialty, 1923 and 1956

Type of practice and specialty of physicians	Number of physicians	
	1923	1956
Total	59	82
Private practice	58	78
General practice	51	38
Practice limited to specialty	7	40
Anesthesiology	0	1
Dermatology	0	1
Internal medicine	1	4
Obstetrics, gynecology	0	3
Ophthalmology, otorhinolaryngology	4	7
Orthopedic surgery	0	1
Pathology	0	2
Pediatrics	0	6
Radiology	1	3
Surgery	1	9
Urology	0	3
Not in private practice	1	4

SOURCE: Washington County Medical Society and American Medical Association directories.

Whereas in 1923 only about one out of eight private practitioners in Washington County limited their practice to a specialty, by 1956 this share had grown to about one out of two (table 6). Special significance for hospital care trends can be found in the increased numbers of specialists in surgery, urology, anesthesiology, obstetrics, pathology, radiology, and other types of practice involving hospital service.

Hospital Beds

One of the factors related to the growth of hospital use in Hagerstown may have been the increase in the supply of hospital beds in the area. From 80–90 beds in 1922–23, Washington County Hospital's capacity grew to 268 beds in 1955–56. The ratio of beds to the population of Washington County increased from 142 to 340 per 100,000. But does this increase in beds necessarily mean that hospital admissions were facilitated?

Two facts suggest that the pressure on available beds in the Washington County Hospital was greater in the recent survey period than in the earlier period. First, between 1922–23 and 1955–56 the use of the hospital, as measured by

the number of patients admitted and total annual patient days, increased faster than did the ratio of beds to population. While the ratio of beds to population increased 2½ times, hospital admissions increased almost seven times and the total annual patient days approximately quadrupled.

Second, the proportions of the hospital's available beds that were in use on any given day tended to be higher in the later period than in the earlier. In 1922–23 the average daily census represented about two-thirds of available beds. The 1955–56 average occupancy, in contrast, was about four-fifths of capacity.

In the later survey period, the availability in Washington County of some nursing home care may have slightly relieved the pressure for long-term hospital care of chronically ill or convalescing patients. Nursing homes were practically unknown in the county in the 1920's. In 1956–57, according to current State plans under the hospital and medical facilities construction (Hill-Burton) program, the county had 327 nursing home beds, with 250 admissions per year.

Socioeconomic Factors

Possible relationships between increased hospitalization rates and changes in socioeconomic status can be measured only in general terms, since there is no comparative information on the occupational and educational characteristics of the surveyed populations, and only a few such data for the population of Hagerstown as a whole. In Hagerstown, as in most other urban areas of the United States, the proportion of the working force in professional, technical, and related occupations has increased. More women are working. Educational levels have risen. These and other socioeconomic changes, which conform generally with national trends, have established a basis for increased popular appreciation of the value and convenience of hospitalization as compared with home care of the sick and injured. At the same time, throughout this period Hagerstown's basic character as a relatively self-sufficient trading center whose principal industries are manufacturing and railroading has remained substantially the same.

Insurance

Other studies have shown a relationship between hospital utilization and hospital insurance coverage. It is possible that in recent years the growth of insurance coverage has encouraged some people in Hagerstown to make greater use of the hospital than would have been made without such insurance. While the earlier Hagerstown survey was conducted before the establishment of the first hospital prepayment plan in the United States, by 1955–57 an estimated three-fifths of all Washington County Hospital patients had insurance and about three-fifths of the total bill to patients was being paid for by insurance. The average cost of care in the Washington County Hospital is about six times higher today than it was 35 years ago, having risen from $3.15 per patient-day in 1923 to $18.30 in 1956. This high cost of hospitalization has virtually required the development of insurance or some other means of spreading the financial burden over a wider segment of the population.

Related Findings

In overall magnitude the hospitalization rates for the surveyed populations in Hagerstown are roughly comparable to those found in similar populations of the same general time periods. The 1955–57 rates agree closely with rates found in the 1956 Public Health Service survey of general hospital use in the Nation, conducted by the Census Bureau (*3*). The Hagerstown survey's admission rate of 104.6 per 1,000 population, adjusted to 114.5 per 1,000 to include hospitalizations outside the Washington County Hospital, compares with a Public Health Service-Census survey rate of 117 per 1,000 for nonmetropolitan places with populations of 10,000 to 50,000. Average length of stay for the Hagerstown surveyed population (including outside hospitalization) was just over 8 days, ranging from 5 days to 14 days from the youngest to the oldest age groups. The average stay for cities of comparable size, as found in the Service's survey, was 7.2 days.

While comparative information is not readily available for the earlier survey period, the use of the Washington County Hospital among the

1921–24 survey population was roughly similar in amount to the use of that hospital by the population of Washington County as a whole in 1922. Thus, annual days of hospital care in relation to population were only slightly higher for the county population than for the surveyed population. For both the Washington County residents and the 1921–24 surveyed population, average length of stay in the Washington County Hospital was about 12 days.

Summary and Conclusions

Two household morbidity surveys conducted by the Public Health Service in Hagerstown, Md., in 1921–24 and 1955–57, together with a concentration of hospitalization in one local hospital, provided the basis for a comparison of rates and patterns of hospitalization in the early 1920's and the mid-1950's. It was found that over this 35-year period, hospitalization rates in Hagerstown had increased three times in terms of annual days of care and 5½ times in terms of admissions.

No single factor accounted for the increase in hospitalization. There was a small growth in the proportion of persons having more than one admission during a given year. The rate of hospitalization increased in all age groups, although the rate of increase was somewhat higher among children under 5 years and persons 65 years and over. The proportion of older persons in the population approximately doubled between 1921–24 and 1955–57.

There were increases in care for practically every diagnostic group studied. Only a part of the large increase in care among women of childbearing age could be attributed to an increase in hospitalization for the delivery of babies. Other diagnostic groups showing larger than average increases for all ages included circulatory diseases, genitourinary disorders, and neoplasms.

Average length of stay in the hospital decreased well over one-third between the earlier and the later surveys, but this decrease only partly offset the effect of increased admission rates in raising total hospital days. The greatest decrease in length of stay was among persons 25–44 years old. Very little change occurred in the lengths of stay of children under 15 and persons 65 and over.

One factor making for increased hospitalization probably was the increased occurrence of certain chronic illnesses, but for the particular illnesses studied the hospitalization rates tended to increase faster than the illness rates. Analysis of death rates showed that more people were dying of chronic diseases and that an increasing proportion of deaths were occurring in the hospital.

While hospital care increased, the supply of physicians relative to population remained about the same in 1955–57 as in 1921–24. The ratio of hospital beds to population was greater in the later period than in the earlier, but not enough greater to keep pace with the increase in hospital use. Hospital insurance coverage facilitated hospitalization in the later period to the extent that it paid for all or part of the hospital bills of about three-fifths of the patients.

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The National Attack on Rheumatic Fever

AIMS C. McGUINNESS, M.D.

WHILE we have made a great deal of progress against rheumatic fever, it is still a killer and crippler; it is still a national menace. Cold statistics give us an idea of its extent, but they can never measure the full tragedy, the hurt to the families whose children have been struck down with this disease. It has been estimated that about 2 million people living in the United States today have already had, or will develop, an attack of rheumatic fever at some time during their lives. Of these, more than 500,000 will probably die because of the rheumatic process or some complication developing directly from it. Rheumatic fever most often strikes children between the ages of 5 and 15, and the resulting rheumatic heart disease causes about 50 percent of all heart disease in this age group. I am told that in the 5- to 19-year age group in this country there is a current annual incidence of about 60,000 cases of rheumatic fever. About half of these are recurrences, and half first attacks.

The total economic waste caused by rheumatic fever in the general population cannot be even roughly estimated. But we do know that during World War II, rheumatic fever alone immobilized more than 400,000 men in the armed services, at a cost to the Government of about $640 million.

We must never lose sight of our ultimate goal: the complete eradication of this killer and crippler. Let us hope that the progress we have made will whip us into even further—and unrelenting—efforts. I think it will.

The concerted national attack on rheumatic fever, in which the Federal Government plays an important role, has shown spectacular growth since it began less than a decade ago. Rheumatic fever and rheumatic heart disease are, of course, a major concern of the National Heart Institute, Public Health Service, and research support in this area has increased more than tenfold since 1949 to a current total of around $1.5 million annually. The institute conducts a substantial research program of its own in Bethesda, but devotes most of its funds to the support of cardiovascular research in hospitals, universities, medical schools, and other institutions throughout the country.

The institute's research grant program in rheumatic fever and rheumatic heart disease is helping scientists approach the problem from many different directions. Population studies are bringing in new knowledge of the movement of streptococcal infection among families and individuals. Scientists are also trying to find out more about the nature of immunity from these infections.

One of the most urgent needs in this field is for more fundamental knowledge of the intricate cellular events and mechanisms of connective tissue, the target of rheumatic fever. For this we need more intricate equipment and more highly skilled workers.

Since the most widely accepted theory of the nature of rheumatic fever is that it is an allergic reaction of certain of the connective tissues to some substance given off by the streptococcus—the cause of streptococcal infections—attention is being focused on the biochemical and biophysical mechanisms involved in allergic responses, and attempts are being made to identify the streptococcal substance to

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which approximately 3 percent of all children between the ages of 5 and 12 seem to be allergic.

Gains in Research

As has often been the case, victory over a disease may be greatly speeded if it can be produced experimentally and studied in animals. For many years, rheumatic fever research has been hampered by inability to produce it in the laboratory. But now scientists believe they have achieved this. Rabbits given repeated injections of streptococci have developed heart defects similar to those of rheumatic heart disease. If further research bears this out, the work should serve as a valuable springboard.

Drug studies are of paramount importance, because we do not as yet have an ideal drug or drug combination for treating rheumatic fever itself. We now know that ACTH and cortisone, at least in the smaller doses used in early studies, are no more effective in treating rheumatic fever than aspirin. We found this out from a very valuable international study conducted in 13 hospitals in the United States, Canada, and Great Britain with the aid of the National Heart Institute. Dr. Albert V. Dorfman and his group at the La Rabida Sanitarium are, I understand, analyzing statistically the first results of a large-scale study they have made of hydrocortisone therapy in rheumatic patients, in which substantially larger doses of drugs have been used.

We now have enough knowledge about the control of rheumatic fever to make possible an adequate and thorough program of preventing it in any community.

Services for Children

Developments in the treatment of children with congenital heart malformations in the last two decades have been truly dramatic. The number of children who were previously doomed to an early and inevitable death has been drastically reduced by the development and use of a wide variety of surgical techniques.

Since 1939, the Children's Bureau through its crippled children's program has been offering children with rheumatic fever medical help that may limit the impairing effect on their later productive lives. At present, all but one State offer services to children with rheumatic heart disease in the crippled children's programs which have developed as a part of the Federal-State partnership.

More recently, the Bureau, with the cooperation of the States, has developed ingenious patterns to make complicated heart surgery available to the maximum number of children with congenital heart defects who can benefit from such surgery. Not only through the regular crippled children's programs but through five regional heart centers as well, children are now receiving surgery for congenital heart malformations which for many of them can make the difference between life and death. The number who have been served under this part of the crippled children's program increased from 2,000 in 1950 to 10,000 in 1957. In the meantime, a variety of surgical techniques, most recently open-heart surgery, have been developed. As a result the number of congenital heart conditions which are operable has increased. At the request of the administration, Congress recognized this development during the current session by appropriating $1.5 million above regular funds for the crippled children's programs to be used especially for these lifesaving heart malformation operations.

Prevention and Control

Illustrative of another approach to the prevention of rheumatic fever is the drive conducted jointly several years ago by the National Heart Institute and the American Heart Association. It made an important contribution. Various aids for physicians and other health workers, such as folders giving the latest diagnostic criteria and treatment recommendations, were sent to every physician in the United States.

Another branch of the Public Health Service, the Bureau of State Services, has played an important part in the national attack on rheumatic fever through its Heart Disease Control Branch. This branch assists States and localities, both through financial grants and assignment of people with special technical skills when they are needed, in establishing and im-

proving heart disease control activities. The establishment of rheumatic fever registers and prophylaxis programs and the development of better rheumatic heart disease diagnosis and casefinding methods are of course vitally important.

In Chicago a new study was started in April 1959 to test the practicality of mass screening as a way of finding children who should seek medical attention for possible heart defects, including those caused by rheumatic fever. A special tape-recording device, developed by the Chicago Heart Association, is being used. The study, in which the heartbeats of 40,000 fourth-grade school children will be recorded, will aid health workers in finding out what problems may be involved in large-scale screening programs of this kind and will also provide data on the number of children with undetected heart defects.

Guiding the project with the Public Health Service is an interagency committee composed of representatives from the Chicago Board of Health and Board of Education, the Chicago Medical Society, the American Heart Association, the Children's Memorial Hospital, the parent-teachers association, and several universities. Since the outlook for children with heart abnormalities is much better if their condition is diagnosed and treated early, the adoption of faster and less expensive methods of finding early cases would certainly save many lives.

Recently, exploration of another promising and rather novel possibility—the use of an electronic computer as an aid to the physician diagnosing cardiovascular disease—was begun by the Heart Disease Control Branch. The basic idea is to develop a computer into which all pertinent objective data could be fed, such as data concerning the electrocardiogram, the phonocardiogram, the ballistocardiogram, and the arterial pulse, together with such factors as age, sex, height, weight, and blood pressure. The computer would then indicate to the physician the probability of specific heart diseases or injuries.

These, of course, are only illustrations of the work affecting the rheumatic fever problem that the Heart Disease Control Branch is aiding. The encouragement and help that it has given State and local health departments to establish and enlarge rheumatic fever programs has been one of the major factors in the tremendous growth of this nationwide endeavor.

The number of States assuming a responsibility for either or both prevention and treatment of rheumatic heart disease increased from 12 in 1950 to 40 in 1958. Also, the number of States now engaged in the distribution of free or low-cost prophylactic drugs has increased from 2 in 1950 to 29 in 1958. A number of the remaining States that have not yet developed programs are encouraging rheumatic fever and rheumatic heart disease control efforts both in local health departments and in nonofficial agencies. These facts certainly show a great public awakening to the problem in this decade.

Along with this awakening to the problem in this and other areas of health research has come some concern that today's large Federal grants in the field of medical research are stifling private giving in the field of health. The fact is that nothing could be farther from the truth.

Support for medical research from all sources jumped from $88 million in 1947 to about $450 million this year. Of this $450 million, the Federal Government contributed approximately half, and the balance came from industry, endowment, and private philanthropy.

In June 1958 a group of consultants on medical research and education, headed by Dr. Stanhope Bayne-Jones, made their report after an exhaustive nationwide study. I was particularly interested in this comment in the report: "Americans have always banded together voluntarily to accomplish certain commonly valued objectives. This has been particularly evident in the health field. . . . Humanitarian sentiments and religious doctrines that foster respect for life and for the individual, combined with respect for science, will engender continuing and strong support for medical research from both public and private sources."

Nutritionists aid staff members of an organized home care team in recognizing and interpreting the importance of diet in the care of patients with long-term illness.

The Nutritionist in Organized Home Care

MILDRED KAUFMAN, M.S., and MARIAN S. BRYAN, M.S.

THE NUTRITIONAL NEEDS of the chronically ill too often are considered only when a therapeutic diet is required. Nutrition service is commonly believed adequate if diet instructions have been given in the hospital or if the physician has provided the patient with a diet list.

Thoughtful observers will quickly recognize that this approach ignores the dynamic role of nutrition in the patient's improvement, rehabilitation, or recovery. Even the most clearly written diet instruction sheet is not effective in motivating patients to change or improve the eating habits of a lifetime. The nutritionist in organized home care plans gives other team members stimulation and guidance in developing the knowledge, skills, and techniques to recognize nutritional needs and to assist patients and their families in achieving and maintaining an appropriate diet.

Nutritionists, as an integral part of organized home care programs, have a valuable contribution to make in the treatment of patients with long-term illness.

Organized Home Care

Organized home care programs have developed in a number of communities as an answer to the mounting problem of providing comprehensive care to patients with long-term illness (*1*). These programs coordinate the various skills of the medical care team and bring them to the patient at home. The trained workers who provide the skilled services also teach family members to perform some of the simpler procedures needed for care of the patient. Through this plan, the patient receives the professional care and supervision he requires while remaining a part of his family and enjoying the comfort and security of his own home. The family continues to provide such basic essentials as food, shelter, laundry, clothing, and other necessities (*2*).

As specifically defined, "Organized home care provides coordinated medical and related services to selected patients at home through a formally structured group comprising at least a family physician, a public health nurse, and a social caseworker assisted by clerical service. For satisfactory functioning, patients must be formally referred and there must be an initial evaluation, monthly review of records, and a final discharge conference. There must be ready access to inpatient facilities." This definition was agreed upon at the Roanoke conference on organized home care which was sponsored by the Public Health Service in June 1958.

Organized home care programs now in operation are administered by hospitals or such agencies as visiting nurse associations and local

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health or welfare departments. Administration and services vary with the agency from which the program operates. Regardless of the administration or agency, the services should be planned around the care needs of the patients. The above definition, as well as a review of the existing programs, indicates that the minimum services considered essential are medical, nursing, and social services, and provision of drugs and supplies. Services considered desirable are physical and occupational therapy, homemaking, health education, and nutrition (*3*).

Nutrition Needs in Long-Term Illness

In considering the needs of patients, optimal nutrition is emphasized as one of the most important environmental factors affecting health. However, nutrition is one area which professional workers might easily overlook if their attention is not directed to it, since the family of the home care patient assumes the responsibility for planning, preparing, and serving his meals.

The kind and quantity of food that will meet his individual needs are essential for each patient. An inadequate diet must be improved to provide an optimal level of nutrients. Special needs require increases above normal nutrient requirements, to help fight infection, or to heal wounds, decubiti, and fractures, or to aid recovery from an anemia. Reducing the obese patient and bringing the underweight up to normal weight often are essential steps in rehabilitation. Correction of constipation through diet can reduce the use of medication and the need for routine enemas. Diabetes, cardiac disease, gastrointestinal disorders, liver or gall bladder disease, or other medical conditions require modified diets, and chewing or swallowing difficulties require changes in the consistency of food.

Whether a therapeutic diet or improvement in the nutritional quality of the diet is ordered, the patient and his family almost inevitably need and desire some guidance in their meal planning. Often there is need for improvement of the nutritional value of the entire family diet.

Because good nutrition can contribute to the vigor, well-being, and therapy of the patient, dietary guidance should be an essential part of a well-organized home care plan.

Role of the Nutritionist

The role of the nutrition consultant in the Philadelphia Home Care Plan illustrates how nutrition services can be integrated into an organized home care program. Administered by the Visiting Nurse Society of Philadelphia, this program is a special service within the agency (*4*). For many years the society has employed a full-time nutrition consultant to help the nurses plan for the nutritional needs of their patients and to participate in student and staff inservice education. When the plan was organized in 1949, it was recognized that the nutrition consultant should be a member of the team and that part of her time should be devoted to home care activities.

The team includes the patient's physician, medical consultant to the plan, nurse coordinator, staff nurse, social worker, physical therapist, occupational therapist, occupational health consultant, as well as the nutrition consultant. At team conferences, candidates are evaluated for admission and plans are made for the care, treatment, and rehabilitation of the patient. At this time, the patient's needs and the contributions of various services are coordinated. The patient's progress is reevaluated periodically at subsequent meetings.

The nutrition consultant interprets to the team the dietary goals desirable for the patient. Dietary guidance is thus coordinated with the other home care services, placing nutrition in its proper perspective. With conference planning, followed by consultation, it is possible for team members who work directly with the patient to integrate nutrition advice into patient contacts and so strengthen diet teaching.

A consultant seldom has direct contact with the patient. She is dependent upon others for background and insight concerning the patient and his home situation. The reports of various team members frequently identify factors motivating family behavior, which must be considered in planning for any workable diet regimen. Time is saved and duplication of effort is avoided by early recognition

at the team conference that nutrition is an important aspect of the total plan for care.

Whether or not giving direct service to patients is the most effective use of the nutritionist's time is a decision to be made within the home care program. Factors affecting this decision might be the number, interest, and preparation of other staff workers to do dietary teaching.

To function as a team member, a well-planned orientation for the nutritionist is vital. She should fully understand the philosophy and objectives of the home care program and how to plan for the nutritional needs of patients in their own homes. It is essential that she work closely with the other team members, and to do so, she should feel comfortable as part of the group and appreciate what each of her coworkers is trying to do. In turn, the nutritionist should make sure that all workers understand her function and the importance of good nutrition to the patient. In achieving these goals, the nutritionist should be active in in-service staff education and have assurance of the support of the program administrator.

Case History

The story of a 27-year-old patient shows how this program operates and how the nutritionist contributes. For this discussion, the patient is called Jane Green.

Jane was admitted to the Philadelphia Home Care Plan in November 1957, after a year of treatment in a large city hospital. Her illness had been diagnosed as Pott's disease, with paraplegia.

As a basis for the first team conference at admission, the patient's physician submitted a medical referral form which reviewed her physical condition and gave orders for nursing care, physical and occupational therapy, and a 2,500 calorie diet with 125 grams of protein. Jane's public assistance visitor was included in the initial conference.

Workers who had visited Jane for evaluation described her as intelligent and cooperative but discouraged because she was bedfast. She complained of weakness and fatigue to each of them. Jane's mother, with whom she lived, took care of the home and meal preparation.

The team concluded that getting about in a wheelchair would be a minimum goal for Jane, but she might achieve ambulation with braces and a return to some gainful employment. It was felt that the patient's poor nutrition contributed to her chronic state of fatigue, an obstacle in achieving the maximum goal. The patient was quoted as stating that she had "a poor appetite," "ate poorly in the hospital," and "could not eat much at home." The physician had told Jane to "eat more protein." Mrs. Green thought this meant expensive cuts of meat and complained that she was unable to afford the diet ordered.

As a result of the conference, the public assistance worker obtained from the physician a request for an additional financial allowance for the prescribed diet. The nutrition consultant suggested that the nurse ask the patient to keep a food-intake record as a more objective criterion in evaluating Jane's current diet. Questions about food habits and home conditions identified areas for the staff nurse to investigate before dietary guidance could be planned.

Shortly after this conference, the nutritionist and nurse met to discuss Jane's diet. Jane's food-intake record showed that she was eating only two meals a day and small servings of selected foods. She was eating much less than the 2,500 calories and the 125 grams of protein prescribed, and her food intake failed to meet recommended dietary allowances for other nutrients (*5*).

Since the prescribed diet did not appear immediately practical, as Jane could not eat large quantities of food, a phone call was made to Jane's physician to inform him of dietary findings. He recognized the problem but, because of the nature of Jane's illness, stressed her need for the prescribed protein intake, optimal levels of other nutrients, and calories to provide gradual weight gain of 10 pounds. He urged that an acceptable diet be planned for Jane, working toward the diet prescription gradually, and asked for reports of progress.

Together the nurse and nutrition consultant prepared a diet plan for Jane considering the diet prescription, her appetite and food preferences, and her mother's limited cooking skill. The plan suggested amounts of specific food

groups to provide about 2,000 calories. A supplemental list specified foods which could be added gradually to bring the diet up to prescribed levels as Jane's appetite increased. Jane had agreed to cooperate, stating that she was anxious to do anything that would contribute to her well-being. Written copies of the diet plan were given to the patient, sent to the physician, and kept in the records of the nurse and nutrition consultant. At the request of Mrs. Green, simple recipes were supplied for the foods listed on the diet, particularly some using nonfat dry milk which the family received as a surplus food commodity.

Reevaluation of the patient's food intake at 2 and 4 months following the initial diet instruction showed considerable improvement. Nurse's notes on successive visits showed that Jane was eating three meals a day regularly and was using an increased amount and variety of foods. However, she still needed more foods rich in vitamins A and C. Jane made a real effort, but constant support and encouragement were required to help her continue with the diet. She said that she was enjoying her food more at home. Mrs. Green had tried some of the recipes the nurse had given to her, and she catered more to Jane's taste than would be possible in the hospital. At the end of 4 months, Jane had gained 6 pounds; she was feeling better and was not as weak and tired as she had been.

Diet plans for Jane had been discussed with her physical and occupational therapists, and they were asked to lend encouragement. The physical therapist reported after 4 months that Jane expressed concern about gaining too much weight. She had explained to Jane that as her food intake was increasing her physical activity was also increasing; that her weight gain so far was satisfactory but when she reached the desired weight, the calorie intake would be modified.

Nine months later at the final evaluation conference, it was reported that Jane was walking with braces, getting around the house, and going outside. Employment possibilities outside the home were being explored with the help of the occupational health consultant. Everyone expressed pleasure with the patient's progress and agreed that improved nutrition was a prime factor in achievement of the treatment goals for this patient.

Use of Nutrition Services

As has been stated, in the Philadelphia program the nutrition consultant attends all of the team planning and evaluation conferences. Individual consultations to give dietary guidance for the patient are held at the request of the nurse or other team member. Requests were made for nutrition consultation on behalf of 95 (49 percent) of the 194 patients admitted from June 1, 1957, to May 31, 1958 (see table).

It will be noted that nutrition consultation was not requested for every patient. Some patients or their families were unable to accept any dietary modification. A few patients died shortly after admission. And in a number of instances, it was felt that an experienced staff nurse had sufficient background to provide suitable dietary guidance without consultation.

With a changing caseload, the demands for nutrition consultation vary from week to week. The nutrition consultant has a flexible schedule and can devote more or less time to home care as needed. She estimates that in an average week she devotes about 6 to 8 hours to individual and team conferences on behalf of patients receiving home care.

Other Patterns

The Philadelphia Home Care Plan has been used to illustrate how a nutritionist in one organized program provides dietary guidance for its patients. It is emphasized, however, that the nutritionist should tailor her service to the individual program and offer to serve in the way that will be most effective for the patients and staff.

Some hospital-based programs utilize the services of their own hospital dietary department. This can be developed in a dietary department which has a well-trained staff with an active patient education program. If the dietitian has initiated diet teaching in the hospital or clinic, she then can follow progress and offer continuing guidance by working with the staff members who visit the patient at home. Since dietary problems of patients at home are

Nutrition consultation in the Philadelphia Home Care Plan, June 1, 1957–May 31, 1958

Diagnostic classification	Patients admitted	Patients for whom nutrition consultation was provided	
		Number	Percent of patients admitted
Cerebral vascular accident	99	44	44. 4
Neurological disorders	26	11	42. 3
Arthritis	25	16	64. 0
Cancer	7	4	57. 1
Fracture	20	7	35. 0
Heart and other circulatory disorders	5	2	40. 0
Diabetes	8	7	87. 5
Tuberculosis	2	2	100. 0
Other	2	2	100. 0
Total	194	95	49. 0

somewhat different from those of hospital patients, the hospital dietitian, working in a home care program and as a member of the home care team, must be oriented by observation and experience to the type of patients cared for by the program and the kinds of homes in which they live. Information concerning diet should be shared with the staff of any of the community agencies who may be providing related services to patients receiving home care.

A number of medical schools have organized home care programs which are used for the training of students. In such programs, a nutritionist can present a dietary teaching program as part of professional education. She can participate actively in team planning and evaluation conferences and, when working directly with patients and their families, demonstrate dietary teaching methods to the students.

In programs that cannot budget a full-time staff nutritionist, it has been possible to "borrow" these services from another health agency. A nutritionist in a cooperating private agency, in the local or State health department, or on the dietary staff in a cooperating hospital is a possibility. With a limited budget, it also might be possible to employ, on a part-time basis, a qualified nutritionist or dietitian living in the community. When utilizing nutrition service from another agency or on a part-time basis, realistic arrangements must be made to provide continuing service and sufficient time for full participation in conferences.

Conclusion

Nutrition services in an organized home care program may be provided effectively in a number of ways, but the main objective is to help each patient achieve and maintain the diet which best meets his needs, with the least difficulty for him and his family. This objective can be accomplished when the diet teaching plan considers the patient's social, emotional, and financial situation as well as his physical problems; when diet is the concern of all workers attending the patient; and when changing dietary needs are a part of the comprehensive plan for care.

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Progress in Reporting Mental Hospital Statistics

Ninth Annual Conference of Mental Hospital Statisticians Albany, N.Y., May 5–7, 1959

THE USE of revised terms to define the movement of mental hospital populations, plans for an interstate cohort study of mental hospital admissions, statistical activities of community mental health programs, and new techniques of reporting mental hospital expenditure data were emphasized at the Ninth Annual Conference of Mental Hospital Statisticians.

The conference, held in Albany, N.Y., May 5–7, 1959, is sponsored annually by the National Institute of Mental Health, Public Health Service.

Delegates from each of the 21 member States of the Model Reporting Area for Mental Hospital Statistics attended (see box insert). Observers from Delaware, Iowa, Massachusetts, North Carolina, and Tennessee were also present, as well as representatives from the Dominion of Canada, the Veterans Administration, and the American Psychiatric Association.

Use of Revised Definitions

New terms describing the movement of mental hospital populations were defined and adopted at the Eighth Annual Conference of the Model Reporting Area in Sacramento, Calif., in May 1958. Subsequently, the director of the mental hospital program in each of the Model Reporting Area States approved these definitions and indicated that the statistical system would be able to incorporate them into its reporting procedures at the beginning of the fiscal year 1960.

The revised definitions differ from those previously used in two major respects: (*a*) the concepts of first admission and readmission have been replaced by substituting a classification of admissions according to type of hospital in which the patients had previous inpatient experience for mental disorders, and (*b*) the definition of a State system has been expanded to include public institutions for the mentally deficient, for purposes of distinguishing between discharges and transfers.

A set of schedules, based on the revised definitions, was proposed for the annual reporting of data to the National Institute of Mental Health by States in the Model Reporting Area as follows:

1. Movement of population by sex.
2. Movement of population by age, sex, and mental disorder.
3. Movement of population by time on books (time in hospital plus time on leave), sex, and mental disorder.
4. Admissions with no record of prior admission in any inpatient psychiatric facility, by age, sex, and mental disorder.
5. Admissions with prior admission to hospitals in the same State system only, by age, sex, and mental disorder.
6. All other admissions by age, sex, and mental disorder.
7. Resident patients at end of year by age, sex, and mental disorder.
8. Personnel employed at end of year.
9. Financial statement.

The suggested schedule for movement of population by sex is considerably more detailed than the one in use. While the current form balances the book population of the hospital

only, the new form covers both items affecting the resident population and those affecting the population on leave. The admission section of this schedule is divided into the following categories:

1. Admissions with no record of prior admission to an inpatient psychiatric facility.
2. Admissions with prior admission to hospitals in the same State system only.
3. Admissions with prior admission to other inpatient psychiatric facilities only.
4. Admissions with prior admission to facilities in both the same State system and other inpatient psychiatric facilities.

Discharges on this schedule are classified as:

1. No further treatment indicated.
2. Against medical advice.
3. Treatment in another facility intended.

It was agreed that this classification would be optional since discharges cannot be so classified in some State systems.

Data on the movement of population by age, sex, and mental disorder and by time on books, sex, and mental disorder have been prepared in only one State. Such data are basic to an understanding of the dynamics of a hospital population. They permit the computation of annual net release and death rates specific for age and for length of time on the hospital rolls.

Rates have been computed according to these variables for a single hospital and have revealed pronounced variations by age, diagnosis, and length of time on books. Studies of trends in these specific indexes can pinpoint the various elements of the hospital populations in which significant changes in the movement of patients are occurring. These studies can also assist in evaluating new therapies and treatment programs as well as changes in administrative policies.

Nationally, consolidation of mental hospital data will pose some problems in that 21 States will be reporting by one set of definitions and the remaining States by another. However, the first year's experience gained by the Model Reporting Area States will be of great assistance to the States not in the area as they convert to the new definitions. It is expected that within 2 years most of the States will be reporting nationally by preparing the same set of tabulations.

Cohort Studies

The report of the first cooperative interstate cohort study entitled, "Patterns of Retention, Release, and Death of First Admissions to State Mental Hospitals in 1954," soon to be published as a monograph, stimulated interest in additional interstate cohort studies. A cohort study committee, appointed at the eighth annual conference, presented its report at the ninth annual conference. The committee indicated that a further cohort study would allow control of certain factors which were not controlled in the first study, hopefully permitting the discovery of further factors responsible for interstate differences in probabilities of release, retention, and death. Analysis of cohorts of admissions for several States should provide a more meaningful picture of the course of hospitalization for mental illness than a study done in a single State.

Discussion of specific questions a new cohort study could answer revealed a major interest in the following:

1. What proportion of a study cohort is in the hospital, has died, or is out of the hospital at certain anniversary dates after admission?
2. What is the probability of first significant release from the hospital within specified intervals of time after admission?
3. What is the probability of return to the hospital within specified intervals of time after release among a cohort of patients who have had a first significant release?

Relationships between these probabilities and such factors as age, sex, diagnosis, marital status, race, legal status, and place of residence could be investigated. Interstate differences in

Model Reporting Area States

Representatives from the following States are members of the Model Reporting Area for Mental Hospital Statistics:

Arkansas	Louisiana	Oklahoma
California	Michigan	Pennsylvania
Connecticut	Minnesota	South Carolina
Illinois	Nebraska	Texas
Indiana	New Jersey	Virginia
Kansas	New York	Washington
Kentucky	Ohio	Wisconsin

the results would answer certain questions about State mental hospital programs and might raise other questions which should be investigated by definitive studies.

A discussion revealed that a variety of cohort studies are in progress in the various Model Reporting Area States. However, the questions under investigation in these studies, the variables being controlled, and the endpoints being used varied considerably. It was agreed, therefore, that a retrospective study would not be feasible.

It was proposed that a prospective study be conducted beginning with patients admitted July 1, 1959. The prospective study would consider three major questions, the determination of the status of each patient on specified anniversary dates after admission, the probability of significant release or death within specified periods of time after admission, and the probability of return to the hospital within specified periods of time after significant release among cohorts of released patients. Status on anniversary dates would be classified as in hospital, died in hospital, or absent from hospital. To answer the second question requires the determination of intervals of time between date of admission and date of death in the hospital or first significant release. To answer the third question requires the computation of intervals between date of first significant release and date of first return to the hospital. It was agreed that second significant release and second return to the hospital would also be considered. A significant release is defined as one from which the patient is not expected to return and includes direct discharges, trial visits, and escapes of over 30 days' duration.

Each State participating in the study would be required to use a standard punchcard layout and a standard code. Analysis of the data would then be made at a central point, using electronic computing equipment. Specific definitions and rules regarding the mechanics of the study were discussed and approved by the conference members.

Community Mental Health Programs

A panel discussion on community mental health programs was conducted by representatives from four States operating such programs. These States are New York, New Jersey, Minnesota, and California. As described, the programs appear to be quite similar. In each of the four States, the programs are a local responsibility and under local control. In order to qualify for State funds, however, the programs must meet certain standards. Once it has been determined that these standards have been met, the State matches local expenditures up to 100 percent. However, each State law, with the exception of California, defines the amount which the State will spend annually per capita population.

Services for which community mental health funds are available include outpatient psychiatric clinics, inpatient psychiatric facilities of general hospitals, psychiatric rehabilitation services, such as workshops and aftercare clinics, and consultant and educational services to schools, courts, health and welfare agencies, and the like. The type and extent of these facilities vary from State to State.

There was general agreement that community mental health programs have done much to stimulate local interest in mental health. However, relatively few data have been collected on various aspects of these programs in an attempt to evaluate them. Each of these States is collecting some information on outpatient clinics, but only one is obtaining any data on the inpatient and rehabilitation aspects of its program. It was pointed out in the discussion that determination of the effect of community mental health programs requires systematic data collection and analysis as early as possible. If such data collection systems are not begun soon, it will be extremely difficult to measure the impact of these various efforts on the total community mental health program.

Mental Hospital Expenditures

Over the past several years much interest has been expressed in the development of more adequate data on mental hospital expenditures. The consensus has been that the expenditure data collected and published by the National Institute of Mental Health have not been comparable from State to State. The eighth an-

nual meeting of the Model Reporting Area recommended that the NIMH Biometrics Branch call together a committee of statisticians and administrative-fiscal people from several State mental hospital systems to discuss ways of obtaining better interstate comparison of expenditure data. Such a committee met in February 1959, and a report of the meeting was given at the conference.

To date, interstate comparisons of expenditures for the care of mental hospital patients have been based almost solely on expenditures for maintenance per patient per day. Problems are inherent in both the numerator and the denominator of such a ratio. Differences among States in accounting procedures and lack of uniform definitions of items to be included in the total maintenance expenditures have resulted in noncomparable total expenditure figures. Furthermore, the use of the average daily resident patient population as a denominator introduces an element of noncomparability into the ratios because of wide variations among State systems in the composition of the resident patient populations. It was agreed, therefore, that this type of ratio could not be used to answer questions relating to the cost of care of specific segments of the hospital population.

The committee further agreed that a classification of the total amount spent per year by a State mental hospital system for the mentally ill according to each of two axes, object and function, would provide much more meaningful information than currently available. The following items were included in the classification by object: personal services (salary and wages), food, utilities, medical and hospital supplies, clothing, household supplies, communications, travel and subsistence, new equipment, repairs and replacement of equipment, repairs to plant, farm supplies, office supplies, miscellaneous supplies, and patient services in the community. The function classification included inpatient care, outpatient care (including followup services), research, training, and central office.

The group agreed that a cross tabulation of these two classifications for each State would provide more useful data than are now available. However, it was recognized that each of these categories requires careful definition. Since this would require a considerable amount of research, it was agreed that the task could not be accomplished by the committee. It was suggested that an application for a grant be prepared by a committee of business managers, accountants, statisticians, and medical administrators to finance a study in which these definitions could be developed. This would involve studying the accounting systems in several State mental hospital systems, testing the definitions finally developed, and obtaining the approval of the commissioners of mental health. Subsequent to the committee meeting, the possibility of sponsorship for such a project has been investigated, and it appears likely that a study design will be formulated within the next year.

Hospital administrators frequently have been asked to indicate the cost of care of specific groups of patients, such as children or those 65 years of age and over. The committee indicated that accounting systems are not currently set up to answer such questions. It was recommended that a project be developed in a few State systems in which the cost of caring for patients 65 years of age and over might be determined on a sampling basis. Such a study might be useful to other State systems in making inferences about their own costs for such patients.

Consideration was given to fiscal data which the National Institute of Mental Health should publish routinely. It was recommended that it might be feasible for NIMH to publish not only expenditures per patient per day but also expenditures per patient under care during the year. Turnover in the hospital population during the year would be taken into account in the latter and, when used in conjunction with the former, would provide more meaningful information than is currently available.

Other Problems

The perennial problem of the need for a more adequate classification of mental hospital personnel was discussed. It was agreed that this problem cannot be solved by statisticians alone and the assistance of personnel officers should be enlisted. The NIMH Biometrics Branch

agreed to organize a committee of personnel officers and statisticians which will meet prior to the next conference to discuss the problem and propose solutions.

Several administrators of mental hospital programs have expressed interest in evaluating the effectiveness of their programs. This stems from an increasing demand by State legislatures for information on the results achieved through expenditures for hospital construction and maintenance and for the care of patients. Thus far, only crude data on movement of hospital populations and on the experience of cohorts of first admissions have been available. While these data have provided partial answers to the questions raised by the administrators, many other important questions have remained unanswered. A description of a project underway to design a tool for measurement of mental hospital effectiveness served as a focal point for discussion of this problem. Several of the participants indicated interest in testing such a tool in their own hospital systems once it has been developed.

Regional Meetings

A report covered the Fourth Midwest Conference on Mental Health Statistics held in Indianapolis, Ind., on October 1 and 2, 1958. The most important aspect of this meeting was a discussion of research projects which the group may undertake on a cooperative interstate basis. Of major interest were factors affecting the admission of aged patients to State mental hospitals. A committee was appointed to design a research plan for such a study and this committee reported briefly on its progress at the conference. Research into the following problem areas was proposed:

1. Socioeconomic and demographic characteristics of the patients.
2. Reasons for admission to the State mental hospital.
3. Assessment of the type of care required by the patient at time of admission.
4. Assessment of the care provided during the course of the patient's hospital stay.
5. Background factors affecting admission.

Further committee work will be required before the design is completed.

Plans are being formulated by the 16 States in the area served by the Southern Regional Education Board to hold a meeting of statisticians in the mental hospital field. Seven of these States are now members of the Model Reporting Area, and it is the aim of this group to assist the remaining nine States in qualifying for membership.

Health Hazards in Drycleaning Plants

A study of drycleaning establishments to determine the extent of employees' exposure to solvents during cleaning operations has been conducted by the California Department of Public Health at the request of the State Board of Dry Cleaners.

State laws regulating drycleaning operations have been successful in promoting a safe working environment, but in some plants, as a result of poor operating procedure and gross negligence in maintenance, a high exposure to perchloroethylene solvent vapor has been observed during the study.

Plant operators favor the recommended use of an inexpensive halide-leak detector and testing for solvent leaks at frequent intervals.

STATEMENT

By Arthur S. Flemming, Secretary of Health, Education, and Welfare, July 14, 1959

Control of Radioactive Wastes

I AM HAPPY to report that the first Federal enforcement action to control contamination of interstate waterways by radioactive wastes has now reached a successful conclusion through voluntary agreement.

As a result, the Vanadium Corporation of America will take immediate steps to prevent radium from its uranium milling operations in Durango, Colo., from being discharged into the Animas River, which flows from Colorado into New Mexico.

Agreement was reached at the second session of a conference held under the auspices of the Public Health Service in Santa Fe, N. Mex., on June 24, 1959. The Surgeon General of the Public Health Service approved the agreement July 14, 1959, and will notify the water pollution control authorities of Colorado and New Mexico, who are responsible for enforcing it. The agreement provides that the Vanadium Corporation within 4 months will be employing measures to reduce the radium in its waste discharge to the minimum it is possible to achieve by known methods.

This first enforcement action involving radioactive pollutants in water is significant for several reasons:

1. It sets a precedent for maintaining high standards in the control of radioactive wastes and human radiation exposure.

Although by merely extracting solid particles of radium from the wastes discharged into the river, radioactivity would have been materially reduced, the agreement goes beyond this and includes removal of all radium that can be removed by known methods.

2. The value of the 1956 law authorizing the Public Health Service to undertake pollution surveys of all interstate streams and to institute antipollution procedures has been dramatically demonstrated.

Approximately 30,000 persons in southwestern Colorado and northwestern New Mexico were using Animas River water, which ranged from 40 percent to 160 percent above maximum permissible levels of radioactive content. This fact was established by an intensive survey of the river, begun by the Public Health Service in April 1958 and completed in April 1959.

Because the law permits the Public Health Service to conduct water pollution surveys and hold conferences on the abatement of interstate pollution, the situation was brought under control before the population of the area had ingested sufficient amounts of this radioactive material to cause detectable health damage.

The pollution abatement procedure under the 1956 law is this: A conference is called by the Surgeon General. If agreement is not reached at the conference, or if the agreement concluded is not fulfilled, a public hearing is called by the Secretary of Health, Education, and Welfare. If the hearing board so recommends, the Secretary of Health, Education, and Welfare is empowered to issue a cease and desist notice which could lead to court action by the Attorney General of the United States.

During 1960, the Public Health Service expects to begin studies of the radioactive content of three rivers in Wyoming: Bighorn, Sweetwater, and North Platte.

3. The disclosure of a hitherto unsuspected hazard of chemical pollution was an important byproduct of the Animas River survey.

When the Public Health Service assigned an aquatic biologist to analyze the amount of radioactivity being absorbed by fish in the river—a standard procedure in such surveys—the biologist found that the river contained few fish and very little other aquatic life. Subsequent study revealed that a number of toxic chemicals which were also contained in waste discharged by the Vanadium Corporation had caused this destruction.

Consequently, the company, in addition to controlling the radium in its wastes, will also recover the toxic chemicals before they reach the river.

Fluoride Naturally Present in Water Supplies

Fluoride occurs naturally in water used by communities in 43 States, according to a Public Health Service report "Natural Fluoride Content of Communal Water Supplies."

Based on data compiled by the dental directors of all State health agencies, the report indicates that the water supplies of 1,903 cities and towns with a combined population of 7 million contain enough fluoride naturally to prevent 2 out of 3 dental cavities.

In Texas, 2,700,000 persons in 356 towns use naturally fluoridated water. In New Mexico, 465,000 people, or 68 percent of the total population, live in communities with such water supplies.

More than 450,000 people in 136 Illinois towns and 406,000 in 184 Iowa communities drink water with fluoride present in nature. At least 100,000 people in each of 10 States, California, Colorado, Florida, Idaho, Indiana, Kansas, Louisiana, Michigan, Ohio, and Wisconsin, live in towns served by naturally fluoridated water supplies.

Thirty-five percent of the 7 million persons using naturally fluoridated water live in towns and cities with populations of more than 50,000. Thirty-eight percent live in towns of from 5,000 to 50,000 and 27 percent in communities of under 1,000.

The fluoride found naturally in water is identical in its effect to the fluoride used in controlled fluoridation, according to Dr. John W. Knutson, chief dental officer of the Public Health Service. The 1,800 cities now using controlled fluoridation adjust the fluoride content to that found in a great many of the naturally fluoridated water supplies throughout the country, or from 0.7 to 1.2 parts of fluoride per million parts of water. The 35 million people living in these 1,800 communities plus the 7 million using naturally fluoridated water means that 1 out of every 3 people using central water supplies now drinks water that has been fluoridated by nature or by the community.

A Record and Reporting System for Field Research Units

BENJAMIN E. CARROLL, M.A., and SAMUEL C. INGRAHAM II, M.D., M.P.H.

A UNIFORM system of records, files, and reporting has been devised to facilitate collection by several field research units of data suitable for consolidation. Its use permits efficient daily operation with the flexibility necessary to serve individual goals of each unit, yet makes practical the reporting of comparable data to a central office for reduction and processing.

The research, under the sponsorship of the Field Investigations and Demonstrations Branch of the National Cancer Institute, Public Health Service, deals with the cytology and epidemiology of human uterine cancer. Each of 10 field units aimed to examine initially around 50,000 to 75,000 or more women, recalling as many as possible for second and third examinations at yearly intervals. The total number examined by all the units is estimated to be of sufficient magnitude to provide statistically valid casefinding, prevalence, and incidence rates for invasive cancer and carcinoma in situ by age group.

In 3 years' operation the record and reporting system has proved effective and workable. A similar plan should be generally usable in medical and public health activities collecting uniform data from geographically separated field stations.

The field research projects obtain cytological specimens, identifying data, and selected medical history information from women recruited from various segments of the population. The specimens are examined in the unit's cytology laboratory. The cytodiagnosis is entered on an individual patient record form for statistical analysis and is also reported to the examinee or her personal physician. Any necessary additional cytological, histodiagnostic, or clinical studies are performed by or at the request of the personal physician, and results of these are also entered on the examinee's record. Since the several units use similar cytological methods, the data can be collated and totaled.

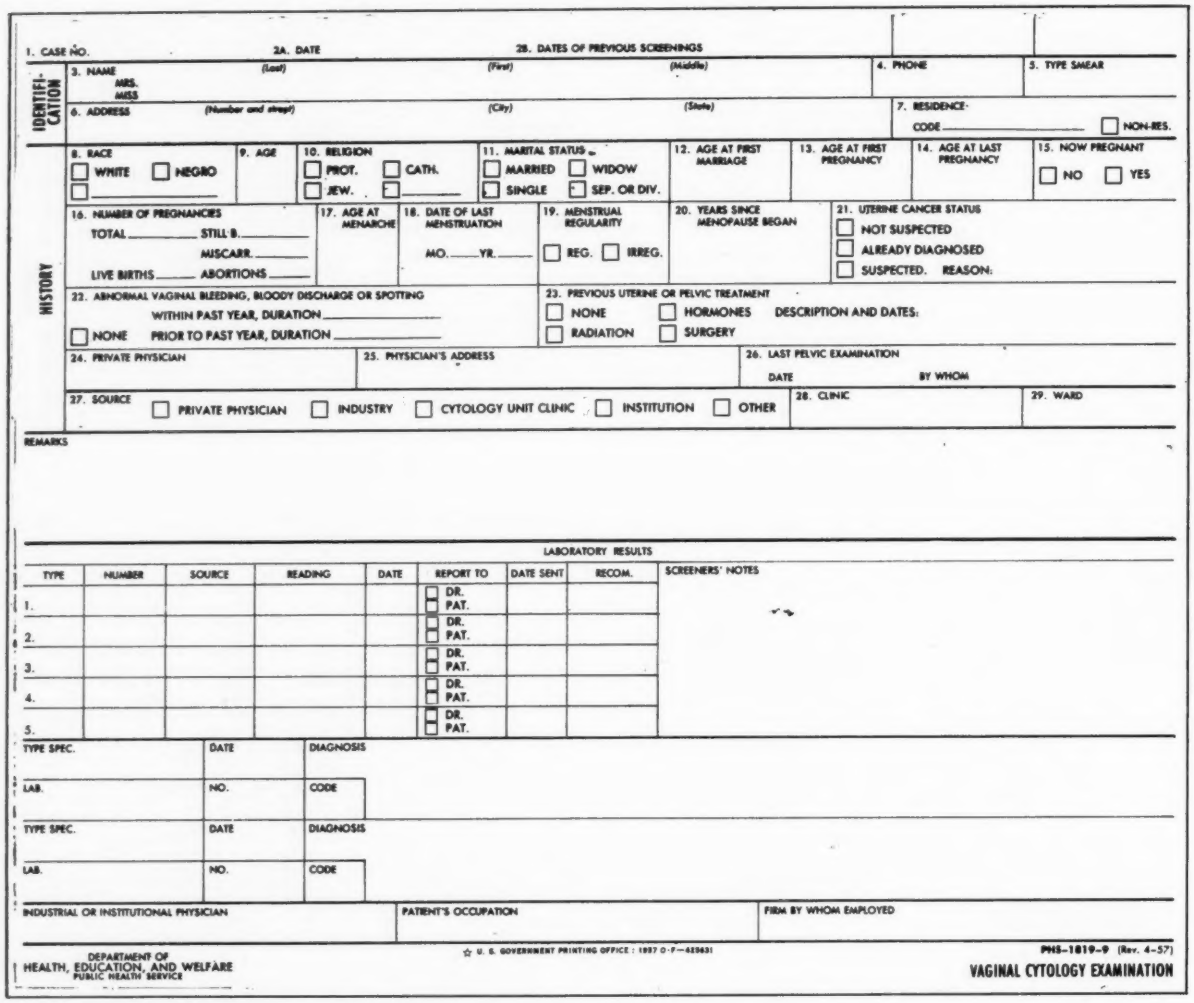
Mr. Carroll is statistician in the Environmental Field Studies Section, and Dr. Ingraham is head of the Diagnostic Development Section, National Cancer Institute, Public Health Service, Bethesda, Md.

Record Forms

Three principal records were designed for the study: a basic medical record card, an alphabetical index, and a recall card. The basic record card has undergone one redesign and revision to take care of practical problems encountered in operation.

The patient medical record is an 8-inch by 10-inch card with fairly generous space for each entry (fig. 1). Its format is intended to facilitate reduction of the data to punchcards. To simplify coding, most of the history items are multiple-choice questions that can be answered by a checkmark or a single word or number. Very little writing need be done to record the complete personal and medical history called for. Results of cytology slide readings and tissue diagnoses are described verbally in designated spaces, but they are also recorded by code numbers. Use of the diagnostic codes simplifies uniform reduction of data for all projects and obviates the interpretation of handwriting and medical terms by coding clerks. Space is provided for results of repeat tests as necessary.

Figure 1. Patient record card



1. CASE NO. 2A. DATE 2B. DATES OF PREVIOUS SCREENINGS

IDENTIFICATION

3. NAME MRS. MISS (Last) (First) (Middle) 4. PHONE 5. TYPE SMEAR

6. ADDRESS (Number and street) (City) (State) 7. RESIDENCE CODE ☐ NON-RES.

HISTORY

8. RACE ☐ WHITE ☐ NEGRO ☐ _____ 9. AGE 10. RELIGION ☐ PROT. ☐ CATH. ☐ JEW. ☐ _____ 11. MARITAL STATUS ☐ MARRIED ☐ WIDOW ☐ SINGLE ☐ SEP. OR DIV. 12. AGE AT FIRST MARRIAGE 13. AGE AT FIRST PREGNANCY 14. AGE AT LAST PREGNANCY 15. NOW PREGNANT ☐ NO ☐ YES

16. NUMBER OF PREGNANCIES TOTAL _____ STILL B. _____ MISCARR. _____ LIVE BIRTHS _____ ABORTIONS _____ 17. AGE AT MENARCHE 18. DATE OF LAST MENSTRUATION MO. _____ YR. _____ 19. MENSTRUAL REGULARITY ☐ REG. ☐ IRREG. 20. YEARS SINCE MENOPAUSE BEGAN 21. UTERINE CANCER STATUS ☐ NOT SUSPECTED ☐ ALREADY DIAGNOSED ☐ SUSPECTED. REASON:

22. ABNORMAL VAGINAL BLEEDING, BLOODY DISCHARGE OR SPOTTING WITHIN PAST YEAR, DURATION _____ ☐ NONE PRIOR TO PAST YEAR, DURATION _____ 23. PREVIOUS UTERINE OR PELVIC TREATMENT ☐ NONE ☐ HORMONES DESCRIPTION AND DATES: ☐ RADIATION ☐ SURGERY

24. PRIVATE PHYSICIAN 25. PHYSICIAN'S ADDRESS 26. LAST PELVIC EXAMINATION DATE BY WHOM

27. SOURCE ☐ PRIVATE PHYSICIAN ☐ INDUSTRY ☐ CYTOLOGY UNIT CLINIC ☐ INSTITUTION ☐ OTHER 28. CLINIC 29. WARD

REMARKS

LABORATORY RESULTS

	TYPE	NUMBER	SOURCE	READING	DATE	REPORT TO	DATE SENT	RECOM.	SCREENERS' NOTES
1.						☐ DR. ☐ PAT.			
2.						☐ DR. ☐ PAT.			
3.						☐ DR. ☐ PAT.			
4.						☐ DR. ☐ PAT.			
5.						☐ DR. ☐ PAT.			

TYPE SPEC.	DATE	DIAGNOSIS
LAB.	NO.	CODE
TYPE SPEC.	DATE	DIAGNOSIS
LAB.	NO.	CODE

INDUSTRIAL OR INSTITUTIONAL PHYSICIAN PATIENT'S OCCUPATION FIRM BY WHOM EMPLOYED

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE PUBLIC HEALTH SERVICE

☆ U. S. GOVERNMENT PRINTING OFFICE : 1957 O-F—423631

PHS–1819–9 (Rev. 4–57)

VAGINAL CYTOLOGY EXAMINATION

The classification of cytology results and final diagnoses based on tissue studies or other procedures was agreed upon by all project directors. To accommodate minor variations in the scheme, two-digit codes were devised. All directors agreed, however, to observe the dividing lines between the five major categories of results as uniformly as possible.

Both sides of the card are identical so that two series of tests may be recorded. Some projects, however, find it more practical to use a fresh card for each series. When used in the immediate environs of a project, this record is printed on a fairly heavy index stock, but when it must be folded or rolled for mailing, it is printed on a lighter stock.

The patient record is initiated by the physician, nurse, or technician who collects the specimen and enters and checks the identification and medical history items. Detailed instructions for completing the card were issued to the staff of all projects. The field unit's central office assigns case numbers for identification and as an automatic count of the number of women examined. An examinee retains the same case number throughout her participation in the project, and each number is used only once. If a number is vacated because of duplication, it is reassigned to a new patient. The field unit keeps a register of its case numbers, showing the numbers in serial order and the names of the examinees.

Patient record cards are filed by case number. This system has the major advantage of expandability by addition at the end. In an alphabetical file, when expansion becomes necessary,

nearly all cards in the file must be shifted. Also, numbers can be sorted and filed much more quickly and accurately than names.

For filing these 8-inch by 10-inch cards, cases are available with shallower drawers than are used in regular letter files. Thus, a case of standard height accommodates five drawers instead of four, which greatly reduces the space required for filing cabinets.

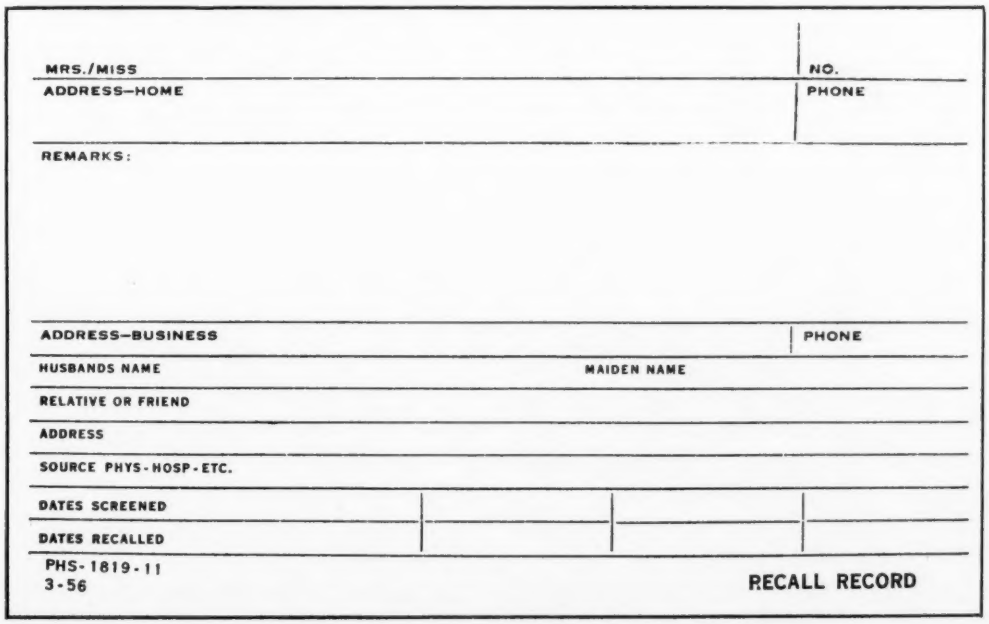
In order to attain the individual project goals, repeat examinations are necessary at stated intervals, usually yearly, on as many examinees as possible. A recall file has been set up to assist in this function. It operates as a tickler file to indicate which examinees are to be recalled each month. The recall card, 3 by 5 inches in size, contains name and case number of patient, home address and telephone, business address (if any), husband's name, and name and address of a friend or relative who presumably will always be in touch with her, plus screening and recall dates (fig. 2). Experience has shown that contact and recall is facilitated greatly by the supplementary information on this card. Quantitative evaluation of the usefulness of the various items in contacting examinees has not been attempted, but each item has been useful in locating some examinees.

Recall cards are filed according to month of examination. A set of index guides for the months of the year is required, along with 12 sets of alphabetical guides, so that names may be alphabetized within each month. All cards filed under a given month are then ready to be lifted out and used for recall 1 year later. If a smear or other specimen is received for a patient before her recall date, her recall card is moved to the current month so that she will not be recalled until a year after the most recent examination.

The recall file is intended only for annual or other routine recalls. The medical record cards for examinees requiring repeat of unsatisfactory or suspicious tests or tissue studies are kept in a temporary file which can be accommodated easily without special provisions. The cards in this file for examinees who do not respond within a reasonable time (60 to 90 days) and who cannot be located by the followup staff are removed and placed in the main record files as incomplete cases. This procedure avoids obstructing the very active temporary file with cards that may never be reactivated.

Since the patient record cards are filed numerically, an alphabetical index is kept to enable the staff to find records by name of the examinee. The alphabetical index is made up on panels mounted on a rotary stand (fig. 3).

Figure 2. Recall card



Each panel accommodates a large number of narrow strips of composition board on which are typed names, addresses, case numbers, and any other identifying information desired.

As the cytological specimen and the medical record card are received at the project records office and before a case number is assigned, each name is checked against the alphabetical index to determine whether or not the individual is a new participant. If an examinee has been seen previously, the existing card is pulled from the file and the new results added. The record cards for new patients are alphabetized and index strips are typed from the cards so that the strips are automatically in proper order for adding to the panels.

The alphabetical index may be started with a small capacity and later expanded. However, starting with the full expected capacity reduces the need for shifting panels and strips as the index expands. In our system, all project directors elected to start with the full capacity. Subdivisions separating an alphabetical file of names into any given number of approximately equal groups are available from filing equipment manufacturers. These are important, since the filling of panels at unequal rates will necessitate the shifting of large numbers of strips from panel to panel to make room. Alphabetical guides for labeling the panels may be purchased or prepared to correspond to such subdivisions.

In addition to these basic records, each project has established one or more subsidiary files for special purposes. These files usually consist of duplicates or abstracts of a portion of the main medical record file to keep closer track of "all positive cases" or "all suspicious cases," for example.

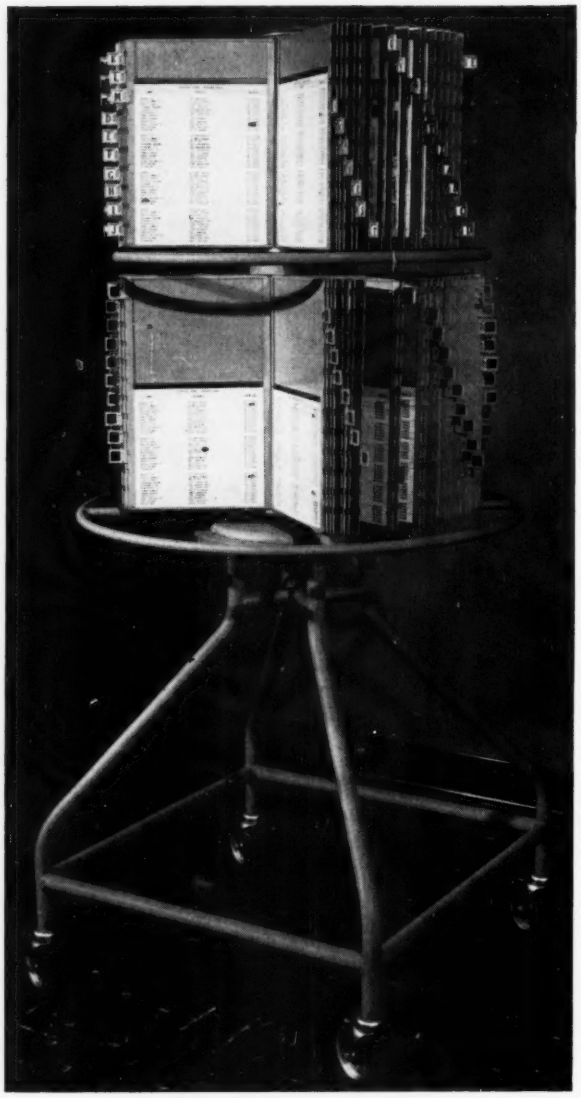


Figure 3. Alphabetical index

Reporting System

Several methods of reporting the data to the central office were considered. Accuracy and simplicity were of course basic requirements, but also it was considered essential to obtain copies of records with minimum disturbance of recordkeeping routines at the field units. Although a number of methods might have met these objectives, it was decided to transmit copies of the records by microfilm. Microfilming is a simple procedure, and it provides a batch of records that is a compact and inseparable unit rather than 1,800 separate prints.

A microfilmer for photographing records on 16-mm. film (at a reduction of 19 to 1) was placed in use in each project. The equipment is rented, and instruction and service as well as installation are included in the rental charge. Thus the personnel of the field unit have a minimum of responsibility for taking care of the machines.

A procedure was set up for filming each record as soon as it is completed and before it is permanently filed. After a record is filmed, the last entry is checkmarked. This notation

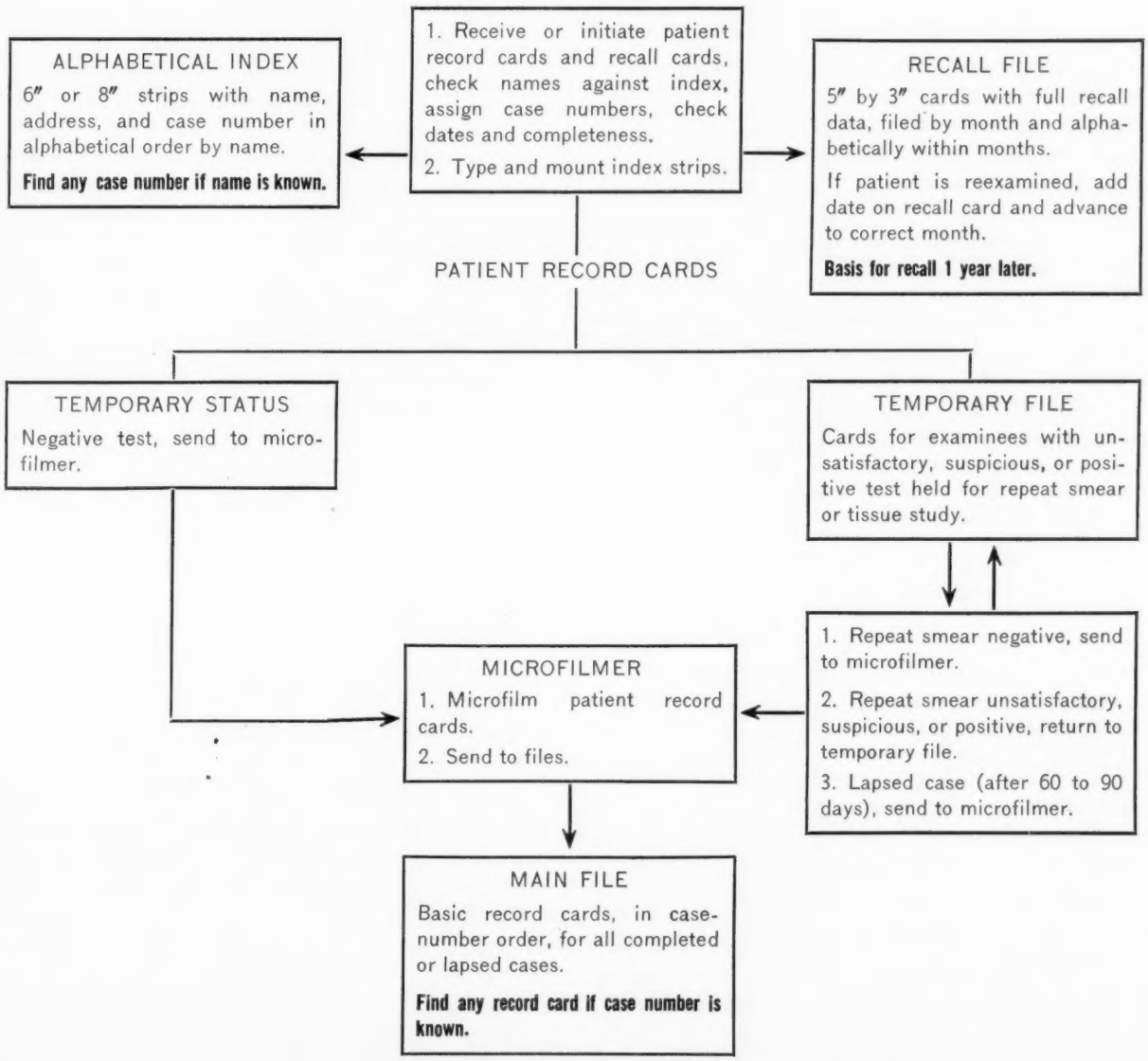
enables the central office coding clerks to tell which results are new if the same record is refilmed later to show more information. When an additional examination is entered on the same form, the record is refilmed to show the new information and the last line of results is again checkmarked. When an annual reexamination is made, the entire case record is filmed, in reverse chronological order, so that the coding clerks can evaluate the patient's entire record.

Since there is occasionally a faulty film, the field unit keeps a record of case numbers included on each reel or flags the group of cards in the file until informed by the central office that the film has been received and is satisfactory.

The microfilm reels are mailed in preaddressed envelopes to the vendor in Washington, D.C., where they are developed and forwarded to the central office of the study. When a reel is received, the central office routinely mails a fresh reel of film to the field unit.

The microfilm method of transmitting records is highly satisfactory. It provides the central office with a current account of the number of examinees and the correctness of record-keeping. It makes possible the current or nearly

Flow Chart for Cytology Project Records



current reduction of all data to punchcards. It encourages accurate and legible records, since everyone concerned knows that the records must be capable of photographic reproduction. The method is economical for large numbers of records, and no copying errors can occur. Project files are not disturbed, since record cards are microfilmed before they are filed.

Central Office Operations

Centralization of coding operations has proved its worth. It permits control by the central office of the code used, the interpretation of coding rules, special decisions, and the like. The central office, having in mind the objectives of the entire study, can apply the same rules and procedures to all data.

For economy and speed, coding is done and cards are punched directly from the microfilm images. This procedure is used by the National Office of Vital Statistics, Public Health Service, for the large volume of documents it receives on microfilm. It has proved practical and economical, since the touching of a key is quicker and less laborious than writing a code digit. The coding clerk, after a few weeks' training, becomes thoroughly familiar with the code and quite adept at the job, coding and punching from 75 to 100 cards per hour. During the training period and early experience of a coder, all cards are verified by an experienced operator. Thereafter, only non-negative cases and 10 percent of the negatives are verified.

All non-negative cases are verified because, since they are a small percentage of all cases, any errors would have a great effect on results. A few errors in the negative cases, on the other hand, could have only a minor effect on the analysis. Furthermore, essential items on negative cards can be checked in batches by needle or sight, since certain punches must be the same in all cards.

Direct coding and punching has proved particularly useful in handling the unexpectedly large volume of repeat examinations. Copying or the use of carbon paper would have meant a tremendous amount of additional clerical work, with greater opportunity for errors and misunderstandings. With the system in use, a repeat examination calls merely for an additional filming of the card or cards, and an up-to-date punchcard can be produced quickly from the film. Duplicate cards are detected by mechanical matching of case numbers, and the up-to-date card is selected to be retained in the file.

The punchcards contain 45 columns of data which are uniform for all field units. Those units using different types of specimens and those collecting special data are assigned additional columns. Six columns are used for check or control punches beyond the actual data recorded. Four types of cytological smear are used by the 10 units, but the results of a given type of specimen are always punched in the same columns. For rapid routine tabulations, the cytology results are summarized in one column. The code for repeat examinations is shorter than for original examinations, since most of the medical history is already on record and need not be repunched. Items of data for successive examinations are always punched in the same columns to achieve uniformity in sorting and tabulating and in summarizing the cards for an examinee.

Summary

A system of uniform records and files is now in operation in a large research study of human uterine cancer. Designed for collection by a number of separated field stations of data that can be consolidated, it should be adaptable to the needs of other medical or public health projects with similar objectives.

The record system is coordinated with transmittal of data by microfilm to a central office. There the data are coded from the microfilm images and punched directly into cards. Centralization of coding has the advantage of uniformity, and prompt transmittal and punching of data give the further advantages of providing information on status of work and quality of records, making immediately available simple tabulations for administrative purposes and facilitating currency of punchcard data for preliminary or final analysis.

Copies of the instructions for filling out the basic record card, numbering of cases, and microfilming the basic record may be obtained from Mr. Carroll.

Epidemiology of DOG BITES

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Human and Environmental Factors

A RECENT survey of animal bites in selected areas of the United States showed a "reported" animal bite rate of 362 per 100,000 human population per year (*1*). In the same study it was estimated that about 611,500 persons were bitten by animals in the United States during 1957. Domestic animal losses cost about $1 million per year, and medical and public health expenses cost about $5 million per year (*2*). Dogs bite people more often than do any other domestic animals in this country, and they are the most common source of human rabies (*3*). Although dog bites occur frequently, produce human injury, pain, and anxiety, and are costly, as yet there has been no detailed epidemiological study of this problem. Epidemiology has demonstrated its value in acquiring the necessary facts to control infectious diseases and recently has been used successfully to study noninfectious and chronic diseases (*4,5*) as well as other kinds of animal bites (*6*). In this study we have tried to elicit the various human, dog, and environmental

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factors associated with dog bites, and to determine if these factors indicate ways to prevent and control dog bites.

Materials and Methods

All dog bites reported during July and August 1958, in Pittsburgh, Pa., were studied in detail. This period was selected because dog bites are most prevalent during these summer months. Special dog bite report forms were mailed to the hospitals within the city limits and to physicians (general practitioners, internists, surgeons, and pediatricians) who might be expected to treat dog bite cases in their offices. Practicing veterinarians, personnel working in animal hospitals, members of the Animal Rescue League, and the police were also asked to report dog bites.

The report forms contained detailed questions about each dog bite accident. The information on the victim included name, address, age, sex, race, occupation, if he had been bitten during the past 5 years, and if he knew that the dog had bitten other people. Other data included the kind of animal inflicting the bite (hospitals were asked to report all animal bites), the hour (a.m. or p.m.), date, geographic place, anatomic location, and circumstances under which the bite took place, length and depth of the wound, number of sutures that would have been required if the wound had resulted from ordinary trauma, a checklist of items used in treatment, and the name and address of the animal's owner.

When the dog inflicting the bite was traced, its owner was asked to supply additional information to identify the factors associating the animal with the dog bite accident. These factors are described on pages 898–903.

Incidence

During the 2-month period, 947 dog bites were reported in Pittsburgh, 507 during July and 440 during August 1958, a bimonthly incidence of 14 dog bites per 10,000 human population. The annual incidence of dog bites in Pittsburgh is of about the same magnitude as that reported for other cities of comparable size in this country (*1*). It was felt that most of the treated dog bites in the city were reported; in 1957 only 230 bites were reported to have occurred during July and 204 during August. Apparently the reporting system was more effective during July and August 1958 than during the same period in 1957. This improvement can be attributed to private physicians reporting dog bite victims whom they treated in their offices. Of course, some dog bite victims do not seek medical treatment. This seems particularly true if a dog bites his owner.

Characteristics of Victims

Sex. The bimonthly incidence of dog bites per 10,000 population was 19.46 for males and 8.84 for females. Therefore, males were the victims of dog bite accidents more than twice as frequently as females. This finding is consistent with the observation that males are more frequently involved in most types of accidents than females (*7*). This striking sex difference in the incidence of dog bites becomes apparent before the victims reach 5 years of age. Perhaps the high incidence of dog bites among males results from their more aggressive behavior and the fact that males are more likely to have dogs as pets. Generally, females prefer cats or other small animals as pets. Males had higher rates of dog bites in practically every age group (table 1).

Age. The victim's age was an important variable in dog bites. Eighteen percent of all victims were less than 5 years of age, 31 percent of the victims were 5 to 9 years old, and 27 percent were 10 to 19 years of age. Thus, 76 percent of all the victims were less than 20 years of age. For the most part this group consisted of preschool and school children. The rate of dog bites per 10,000 population provides a more meaningful measure of high-risk groups by age. School boys and girls aged 5 to 9 years have the highest bite rate (table 1). The second highest bite rate for males was found in the age group 10 to 19 years, whereas the second highest rate among females was in the less-than-5-year-old group. Children and youths less than 20 years of age have the highest rate because they are intimately associated with dogs as pets, they are often abusive to pets, and, in many instances, they do not know how to care for pets properly. In addition, persons less than 20 years of age are more likely to be engaged in

Table 1. Incidence of dog bites in Pittsburgh, Pa., July and August 1958

Age group (years)	Males			Females		
	Population at risk [1]	Number bites reported	Rate per 10,000	Population at risk [1]	Number bites reported	Rate per 10,000
0–4	31, 390	101	32. 17	30, 623	73	23. 84
5–9	25, 123	185	73. 63	24, 566	104	42. 33
10–19	41, 743	184	44. 07	44, 714	68	15. 21
20–29	54, 655	38	6. 95	60, 358	10	1. 66
30–39	50, 787	40	7. 88	56, 375	9	1. 60
40–49	44, 069	44	9. 98	47, 358	19	4. 01
50–59	39, 312	22	5. 60	39, 184	10	2. 55
60–69	26, 999	8	2. 96	27, 676	10	3. 61
70 and over	14, 329	17	11. 86	17, 545	5	2. 85
Total	328, 407	639	19. 46	348, 399	308	8. 84

[1] Based on the 1950 U.S. census of the population of Pittsburgh, Pa.

activities which excite dogs, such as playing ball, running, riding bicycles, and delivering newspapers.

Race. There were 540 white males and 99 nonwhite males and 263 white females and 45 nonwhite females bitten by dogs. Although there were more bites among whites than nonwhites, the incidence of bites per 10,000 population at risk was higher for the nonwhites. The nonwhite population of Pittsburgh is not large and is composed primarily of Negroes. The rates of bites per 10,000 population was 18.75 for white males compared with 24.48 for nonwhite males, and 8.60 for white females compared with 10.58 for nonwhite females. There were no significant differences between the bite rates of the whites and the nonwhites, for both sexes, up to the age of 20 years.

From 20 through 49 years of age the nonwhites had a high rate of dog bites. This finding was associated with the occupations of the victims. Most of the nonwhite victims in this age range were employed in occupations which brought them to the dog owner's home in their jobs as delivery men, mailmen, milkmen, laborers, and garbage collectors. There was no evidence to suggest that nonwhites were more likely to report dog bites than whites, nor that dogs were more partial to biting nonwhite than white persons. The higher rate of dog bites among Negroes in Pittsburgh is in agreement with data obtained from a survey of dog bites in Arlington, Va. (*8*).

Occupation. Definite groups of individuals run a high risk of being bitten by dogs. School children and preschool children were the most frequent victims, especially if they either owned a dog or lived within three houses of a dog owner's home (table 2). Persons coming to the dog owner's home in the line of work also were frequently bitten. If newspaper boys and mailmen were included in this group, then 13 percent of all the victims were in this occupational category. During July and August 1958, 33 newspaper boys and 26

Table 2. Occupations of dog bite victims, Pittsburgh, Pa., July and August 1958

Occupation	Persons bitten		Number previous dog bites last 5 years
	Number	Percent	
School child	414	44	27
Preschool child	239	25	21
Persons coming to house in line of work [1]	56	6	2
Housewife	50	5	2
Newspaper boy	33	4	2
Mailman	26	3	3
Police or fireman	7	<1	0
Veterinarian	6	<1	5
All others	116	12	0
Total	947	100	62

[1] Delivery man, 12; milkman, 12; gardener, plumber, painter, meter reader, 12; salesman, insurance collector, 11; utility man, laborer, 6; and garbage collector, 3.

mailmen were bitten by dogs in Pittsburgh. Projection of these findings to a national level indicates that probably tens of thousands of newspaper boys and postmen are bitten by dogs in this country annually. Veterinarians and their assistants also would appear to be frequent victims of dog bites. For example, of the six veterinarians bitten during this 2-month period, five, or 83 percent, stated that they had suffered previous dog bites during the past 5 years.

The percentages of individuals in the various occupational groups who experienced previous dog bites in the past 5 years were mailmen, 11; preschool children, 9; school children, 6; newspaper boys, 6; housewives, 4; and persons coming to the house in the line of work, 4. These findings further demonstrate the frequency of dog bites in these occupational groups. Measures to prevent and control dog bites should be directed toward these high-risk occupational groups.

Anatomic part bitten. As one might suppose, most dog bites (76 percent) were inflicted on the extremities, 39 percent on the legs and 37 percent on the arms. This anatomic distribution of bites is consistent with the height of dogs in relation to man, with the fact that people use their arms and legs to ward off attacking dogs, and with the observation that the extremities provide a better biting surface for dogs than the trunk.

It is shocking that 151, or 16 percent, of the dog bites occurred on the victim's head, face, and neck. With four exceptions, all of these potentially disfiguring bites about the head, face, and neck occurred among children less than 12 years of age. In a community survey of dog bites in Arlington, Va., 17.8 percent of the bites were located on the head and neck of the patients (*8*). One investigator reported that 25 percent of all dog bites treated in a general hospital were on the head and neck of the victims (*9*). Only 33, or 4 percent, of the 947 dog bites were on the buttocks and lower back.

Severity of wounds. Prior to this study, little was known about the severity of the wounds resulting from dog bites. The concept of a biological gradient was used for classifying the severity of dog bites. At the two extremes of the gradient are dog bites which produce no detectable injury and those which result directly or indirectly in the death of the individual. Wounds were classified according to severity as (*a*) none—dog bites producing no detectable injury; (*b*) minor—dog bites producing abrasions, lacerations, contusions, and puncture wounds which would not have required sutures if the wound had been produced by ordinary trauma (not an animal bite); (*c*) moderate—wounds which would have required from 1 to 10 sutures if they had resulted from trauma; and (*d*) severe—wounds which would have required more than 10 sutures if they had resulted from trauma.

Of the 947 reported dog bites, 20, or 2 percent, produced no detectable injury; 831, or 88 percent, resulted in minor injuries; 86, or 9 percent, were moderate injuries; and only 10, or 1 percent, were severe injuries (table 3). There were no fatal injuries. Dog bites which result in no detectable injury probably occur in greater numbers than indicated in this study because these patients do not often seek medical treatment. Also, it seems likely than many persons with minor injuries resulting from dog bites fail to seek medical treatment. Therefore,

Table 3. Anatomic location and severity of dog bite wounds of victims, Pittsburgh, Pa., July and August 1958

Location of wound	Severity of wounds [1]				Total	
	None	Minor	Moderate	Severe	Number	Percent
Upper extremities	7	304	37	3	351	37
Lower extremities	9	345	15	1	370	39
Head, face, and neck	1	110	34	6	151	16
Trunk, excluding back	0	42	0	0	42	4
Back and buttocks	3	30	0	0	33	4
Total	20	831	86	10	947	100

[1] None—dog bite, no detectable wound; minor—abrasions, lacerations, contusions, and puncture wounds which would not have required sutures if they had resulted from trauma (not an animal bite); moderate—wounds which would have required 1–10 sutures if they had resulted from trauma; severe—wounds which would have required more than 10 sutures if they had resulted from trauma.

probably somewhat less than 10 percent of all dog bites produce moderately severe and severe injuries.

Few human fatalities result from dog bites. During 1955 there were only 10 human deaths in the United States from dog bites (*1*). It is of interest that the percentages of moderately severe and severe injuries according to the anatomic sites were head, face, and neck, 26 percent; upper extremities, 11 percent; and lower extremities, 4 percent. This phenomenon seems indirectly related to the amount of protective clothing worn over these parts of the body.

The head, face, and neck are usually uncovered, while shoes, socks, skirts, and trousers afford some protection to the lower extremities. In this study, only 2 of the moderately severe and severe dog bite wounds on the extremities required subsequent plastic surgery, while 13 of those on the head, face, and neck did. Other studies are in agreement that a high proportion of dog bite wounds requiring surgical and plastic surgical procedures are on the head, face, and neck (*9, 10*).

Mechanism of bite accidents. One of the most interesting aspects of dog bites is the manner in which they occurred. A recent study of mammalian bites among young children indicated that often the child—and not the animal—provoked the bite (*11*). To elicit the causes, the victim's account of the circumstances of the bite was compared with the dog owner's account of how the bite happened. It was felt that the owner's views might present the dog's side of the story. The dog owners were eager to cooperate in this study, expressed sympathetic concern for the victims, and, with two exceptions, displayed no hostility. About one-third (32 percent) of the owners stated that they witnessed the dog bite accident, and an additional 13 percent of the dog bite accidents were seen by another member of the family or by a neighbor. Therefore, about one-half of the dog bite accidents were witnessed by a person other than the victim.

The mechanisms of bite accidents fall into four major categories: (*a*) bites unprovoked by humans; (*b*) bites incurred while petting or playing with dogs; (*c*) bites precipitated by human activities; and (*d*) all others (table 4). In only 9 percent of the bites did the dog owners disagree with the victim about how the bite happened. Approximately 4 percent of bites unprovoked by man and 5 percent of the bites incurred while petting or playing with dogs were attributed by the owners to abusing and teasing the dog or to trespassing. Taking these differences into account, it seems reasonable to state that about one-third of the bite accidents resulted from dogs biting maliciously without human provocation; one-third, while the victims were petting or playing with dogs; and one-third, when human activities provoked the dogs to bite.

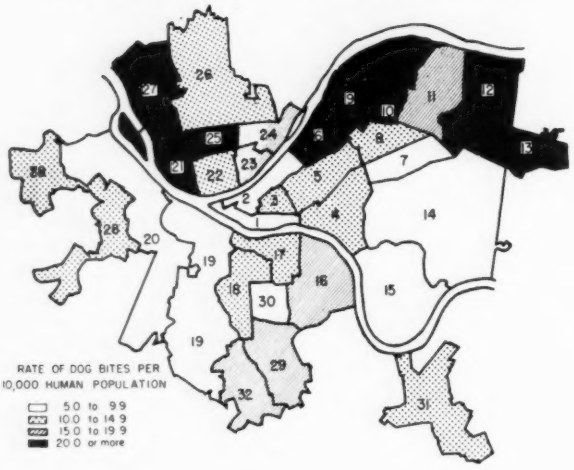
Table 4. Victims' accounts of circumstances of dog bite accidents, Pittsburgh, Pa., July and August 1958

Victim's account of dog bite	Dog bites	
	Number	Percent
Bites unprovoked by man	335	35
Bitten while visiting home in line of work	56	6
Bitten while delivering newspaper	33	3
Bitten while delivering mail	26	3
All other unprovoked attacks	220	23
Bitten while petting or playing with dogs	347	37
Petting or playing with dog	229	24
Riding bicycle, motor scooter, vehicle	44	5
Child running while playing	33	4
Playing ball with dog	23	2
Playing with chained dog	18	2
Bites precipitated by human activities	237	25
Feeding dog	67	7
Abusing or teasing dog	59	6
Separating fighting dogs and cats	28	3
Accidentally stepping or falling on dog	19	2
Picking up or holding dog	16	2
Helping injured animal	16	2
Playing roughly with dog's owner	11	1
Picking up pup	11	1
Abruptly arousing sleeping dog	10	1
All others	28	3
Total	947	100

Environmental Factors

There is a definite biological pattern for dog bites just as there is a comparable pattern for

Geographic distribution of dog bites by wards in Pittsburgh, Pa., July and August 1958



other types of animal bites (*6*, *12*). Some of the environmental conditions investigated in this study were the geographic distribution of bites by city wards, the relation between bites and proximity to the dog owner's home or the victim's home, the seasonal variation of bites, and the frequency of bites according to days of the week and hours of the day.

Geographic location. To test the hypothesis that dog bites occur more frequently in residential areas than in business and industrial areas of the city, the incidence of dog bites by city wards was calculated by tracing the address where the bite was reported to have happened.

Estimates of the 1957 population rather than the 1950 census, which does not reflect recent population movement within the city, were used to calculate the incidence of dog bites per 10,000 human population for the 32 wards of Pittsburgh during the study period (see chart).

Wards 1 and 2 are downtown business areas of Pittsburgh which had less than 10 bites per 10,000 population. The wards with the highest rates of bites (6, 9, 10, 12, 13, 21, 25, and 27) are primarily residential; industrial areas (17, 19, and 20) had relatively low rates. Some of the differences in rates among wards may be due to differences in dog populations. Poor reporting in some wards was not thought to be a major bias influencing the incidence of bites.

These findings reflect the fact that dog bite accidents are most prevalent in areas where homes are most abundant, and children, the most frequent victims, and dogs are more common.

The report forms also indicated that most bite accidents happened in the vicinity of the dog owner's residence rather than the victim's (table 5). Vicinity included inside the home, the yard, and the street in front and back of the home; neighborhood was the area within 2 blocks' radius of the home. In the study, 65 percent of the accidents occurred in the vicinity of the dog owner's home, 18 percent in the neighborhood near the dog owner's home, and 9 percent in the vicinity of the victim's home. Most of the dogs responsible for bites which occurred away from the neighborhood of the dog owner's home and the victim's home were difficult to trace. Presumably, a large proportion of these animals were stray dogs.

Seasonal variation. In a previous publication (*1*) we demonstrated a seasonal distribution for dog bite accidents in Pittsburgh. The incidence of bites was lowest during the winter months, increased during March and April, and reached a peak during the summer months. A similar seasonal distribution of dog bites was reported for Arlington, Va. (*8*), and for Ann Arbor, Mich. (*9*). These observations are sup-

Table 5. Places where dog bite accidents occurred, Pittsburgh, Pa., July and August 1958

Place of accident	Dog bites	
	Number	Percent
Vicinity of dog owner's home	612	65
In dog owner's yard	358	38
Street in front or behind owner's yard	120	13
Inside owner's house	87	9
On porch of owner's house	47	5
In neighborhood[1] near dog owner's home	166	18
Vicinity of victim's home	83	9
In victim's yard	53	6
Street in front of or behind victim's yard	19	2
Inside victim's house	11	1
On sidewalk or street not near owner's or victim's home or neighborhood[1]	37	4
Park or playground	20	2
Animal hospital	6	<1
All others	23	2
Total	947	100

[1] Area within 2 blocks' radius of home.

Table 6. Day of week and time of day dog bite accidents occurred, Pittsburgh, Pa., July and August 1958

Time of day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total	
								Number	Percent
6–11:59 a.m.	12	29	36	14	21	12	17	141	15
12–5:59 p.m.	51	44	41	56	60	50	59	361	38
6–11:59 p.m.	43	65	48	48	60	66	58	388	41
12–5:59 a.m.	0	5	6	0	8	2	3	24	3
Unknown	6	4	7	4	0	8	4	33	3
Total	112	147	138	122	149	138	141	947	100

ported by clinical impressions of epidemics of dog bites during the summer months and by popular notions of dog days. There is reason to believe that this seasonal variation of dog bites is nationwide; however, it is probably not as distinct in the southern parts of the country. The high incidence of bites during the summer months more likely resulted from more children being "exposed" to dogs at this time. Also, in colder climates dogs are allowed more freedom during summer months.

During the winter (school) months most dog bites occurred on Saturday and Sunday (*1*). However, during the summer months there was little variation in the frequency of bites by days of the week (table 6). Of 947 reported bites, 141, or 15 percent, happened from 6 to 11:59 a.m.; 361, or 38 percent, from 12 to 5:59 p.m.; 388, or 41 percent, from 6 to 11:59 p.m.; and 24, or 3 percent, from 12 to 5:59 a.m. The time was unknown for 33, or 3 percent, of the bites. Of course, not many dog bites would be expected from 12 to 5:59 a.m., but it is difficult to explain why only 15 percent of the bites occurred from 6 to 11:59 a.m. Most dog bites (79 percent) happened between noon and midnight.

Discussion

This study of the epidemiology of dog bites would seem to indicate that human factors are more important than environmental factors in the genesis of dog bites. Most environmental factors associated with dog bites reflect man's activity at a particular place or time rather than specific effects of environment per se. However, the geographic distribution of bites by city wards points out areas where intensive control measures should be carried out.

On the basis of human factors which were unveiled in this study, certain recommendations for the prevention of dog bites can be made:

- Do not give a dog to children under the age of 6 years. This might help eliminate about 18 percent of the bites.
- Teach children how to care for their pets and not to abuse or tease dogs.
- Discourage playing ball with a dog, riding bicycles and other vehicles in the vicinity of excited dogs, and running while playing with a dog, if it excites him. These measures might prevent about 10 percent of all dog bites.
- Do not pet, startle, or take food away from a dog while feeding him and do not intercede in dog fights. These suggestions might eliminate another 10 percent of the bites.
- Exercise caution while assisting injured and sick animals, avoid abruptly arousing sleeping dogs, and be careful in picking up pups so as not to offend the mother dog. These measures might prevent another 3 percent of all bites.
- Avoid holding your face next to a dog's to prevent disfiguring facial wounds.

Admittedly, these preventive measures are confining for dog owners, but they are suggested on the basis of scientific facts, and if they were followed, about 40 to 50 percent of all dog bites might be prevented.

Summary

An epidemiological study was made of 947 dog bite accidents which occurred in Pitts-

burgh, Pa., during July and August 1958. The incidence of bites per 10,000 human population was 19.46 for males and 8.84 for females; 76 percent of the victims were less than 20 years of age. The rate of bites was higher for nonwhites than for whites.

High-risk groups identified were: school children, preschool children, persons coming to the dog owner's house in the line of work, newspaper boys, mailmen, and veterinarians.

Seventy-six percent of the bites were inflicted on the extremities, 16 percent on the head, face, and neck, and 8 percent on the trunk. Only about 10 percent of the bites were moderately severe or severe. There were no fatal dog bites. A high percentage of facial wounds required subsequent plastic surgery.

About one-third of the bite accidents resulted from dogs biting maliciously without human provocation, one-third happened while the victims were petting or playing with dogs, and one-third were attributed to human activities which caused the dogs to bite.

The following environmental factors were identified: the incidence of bites was higher in residential than in business or industrial areas of the city; 65 percent of the bites happened near the dog owner's home, 18 percent in the neighborhood near the owner's home, 9 percent near the victim's home, and the remaining 8 percent occurred elsewhere in the city; most dog bites happened during the spring and summer months; and 79 percent of the bite accidents occurred between noon and midnight.

Characteristics of Biting Dogs

PRACTICALLY NOTHING is known about the characteristics of dogs which bite man. The question of how the dogs involved in dog bite accidents differ from other dogs is as important to the veterinary epidemiologist studying dog bites as determining the classification, type, and strain of a bacterial agent is to a microbiologist.

In an epidemiological study of 947 dog bite accidents which occurred during July and August 1958 in Pittsburgh, Pa., we tried to determine what breeds of dogs are most likely to bite people, to elicit other characteristics, such as age and sex, of the dogs associated with accidents, and to find the pertinent animal factors which are necessary for planning an adequate dog bite and rabies control program.

In this study the name and address of the owner of the dog were obtained from the dog bite report forms sent in by hospitals and physicians treating bites. When this information was not available from the report form, the Allegheny County Health Department and the Pittsburgh Police Department traced the dog owners. They were requested to complete a questionnaire supplying the following information: the name and address of the owner; the age, sex, and breed of the dog; number of times the dog had bitten other people within the past year; vaccination against rabies and date; possession of a 1958 dog license and the number of the license; involvement in frequent dog fights; the circumstances of the bite accident as the owner understood it; and whether the owner witnessed the bite accident.

One serious limitation to all dog population estimates is the unknown number of stray dogs. This statistical problem was circumvented by limiting the study to licensed dogs.

According to the records of the Pittsburgh Dog Licensing Bureau, 19,334 dog licenses were issued as of September 1, 1958, 15,579 for male dogs and 3,755 for female dogs. The rates of bites inflicted by licensed dogs were computed using 19,334 as the population base. Information about the age, sex, and breed was obtained by studying a 2 percent random sample of the total licensed dog population.

Incidence

Of the 947 dogs inflicting bites, 767, or 81 percent, were traced to owners, and 180, or 19 percent, could not be traced. Presumably, a

large proportion of the dogs which could not be traced were strays. Of those traced to owners, 571, or 74 percent, were licensed, and 196, or 26 percent, were not. This study was concerned primarily with the 571 dogs which were traced to owners and had dog licenses, but many of the findings apply to the unlicensed dogs with owners.

Sex. Of the licensed dogs inflicting bites, 416 were males and only 155 were females (table 1). If the licensed dog population at risk were unknown, it would be easy to assume that males are more likely to bite people than females. This was not true. Licensed female dogs had a bite rate of 4.1 per 100 dogs, whereas males had a bite rate of only 2.7 per 100 dogs. Contrary to popular opinion, this sex difference in bite rates was not related to the females caring for newborn pups as only 11, or 7 percent, of the 155 bites happened while the victim was playing with a pup. Only one bite by a female dog was reported to have occurred while the dog was in its oestrous cycle. Apparently city dwellers prefer owning male dogs, since 15,579 licenses were issued for male dogs and only 3,755 for female dogs. There is no evidence to suggest that a dog owner is more likely to obtain a license for a male dog.

Age. Dogs less than 6 months of age do not require a license in Pittsburgh. It is interesting that more than 50 percent of the licensed dogs were less than 5 years old (table 1). A vast majority (80 to 85 percent) of the licensed dogs of both sexes were from 1 to 9 years of age, and only about 10 percent were 10 years of age or over. A striking finding is that younger dogs are more likely to bite people than older dogs. This was particularly true for dogs between 6 and 11 months of age. A smaller proportion of dogs 5 years of age or over bite humans than would be expected. Perhaps younger dogs experience difficulty in adjusting to their domestic status. In effect, they have not been trained how to behave toward people. Young dogs in intimate association with young children would seem to invite frequent dog bite accidents.

Breeds. One of the most important hypotheses tested is that certain breeds of dogs are more likely to bite people than other breeds. Veterinarians from time to time have expressed clinical impressions about the temperament of certain breeds of dogs, but, as far as we know, there have been no previous studies to confirm these impressions in relation to dog bites.

The recognized breeds of dogs were arranged into six groups, a modification of the American Kennel Club classification (*13*). Mixed breeds and unrecognized breeds were listed as additional groups. Grouping the many breeds of dogs in these large categories was the only practical way to handle the data, and thousands of dog bite cases would have been required to demonstrate significant differences in

Table 1. Age and sex of licensed dogs inflicting bites, Pittsburgh, Pa., July and August 1958

Age of dog	Males			Females		
	Dogs inflicting bites		Percent in total licensed dog population	Dogs inflicting bites		Percent in total licensed dog population
	Number	Percent		Number	Percent	
0–5 months	[1] 18	4.3	[2]	[1] 12	7.7	[2]
6–11 months	54	13.0	4.2	21	13.6	7.3
1–4 years	200	48.1	49.0	77	49.7	47.3
5–9 years	114	27.4	36.8	38	24.5	34.3
10–14 years	20	4.8	9.0	5	3.2	11.1
15–19 years	3	.7	.5	0		
Unknown	7	1.7	.5	2	1.3	
Total	416	100.0	100.0	155	100.0	100.0

[1] Unlicensed dogs less than 6 months old traced through bite report forms. [2] Licenses not required for dogs less than 6 months old.

bites among the individual breeds. Owing to the larger number of breeds in each group, the following levels of confidence were set: probably significant when $P=<0.05$; significant when $P=<0.01$; highly significant when $P=<0.001$.

Most people in Pittsburgh own dogs of mixed breeds (table 2). Hounds, terriers, and sporting dogs ranked next in popularity. The large number of mixed breeds with licenses would seem to suggest that people obtain licenses for these dogs about as often as they do for dogs of recognized breeds. The data in table 2 indicate that working dogs are much more likely to bite people than any other group. The working dog group includes the following well-known breeds: boxers, collies, Eskimo dogs, German shepherd dogs, great Danes, Saint Bernards, and Doberman pinschers. For this group 48 bites were expected, but 90 were reported, indicating a highly significant difference.

Sporting dogs inflicted more bites than were expected (59 expected, 75 reported). This difference is probably significant ($P=<0.05$). The sporting dog group includes various breeds of pointers, setters, retrievers, and spaniels. On the other hand, hounds bite fewer people than would be expected (82 expected, but only 34 reported). These findings indicate that hounds are relatively safe dogs to own. No significant differences in the frequency of bites could be demonstrated for mixed breeds, terriers, toys, nonsporting dogs, and unrecognized breeds. It was not possible to single out an individual breed as being particularly vicious. This preliminary study, however, suggests that such breeds probably do exist and that additional studies along this line of inquiry may prove fruitful.

Behavior. To determine whether a pet was a chronic offender, a history of the previous biting experience of dogs involved in bite accidents was sought from owners. Victims were also asked about the animal's history because owners can be unaware that their pets have inflicted a bite, and a victim may know of others bitten by the same dog.

The dog owners volunteered the following information about the number of bites their dogs had inflicted during the past year. Forty-seven dogs inflicted 2 bites; 16 dogs inflicted 3 bites; 1 dog, 4 bites; and 4 dogs, 5 bites. Most of the dog owners expressed considerable concern about what to do with dogs that were chronic biters. On the other hand, the victims stated the dog which bit them had bitten the following number of persons (including the victim) in the last year: 83 dogs bit 2 people; 2 dogs bit 3 people; and 1 dog bit 8 people. Fifteen percent of the dog owners did not agree with the victims' statements. However, it was apparent that some dogs are notorious for biting people.

Only 15 of the owners stated that their dogs were involved frequently in dog fights. If these impressions of dogs' pugnacious behavior toward other dogs are correct, then there is no

Table 2. Distribution of bites inflicted by various groups of licensed dogs, Pittsburgh, Pa., July and August 1958

Groups of breeds [1]	Estimated licensed dog population [2]	Number bites reported	Number bites expected	Test for significance—*P*
Mixed	9,376	271	277	<0.70 but >0.50
Sporting	2,011	75	59	<0.05 but >0.02
Hounds	2,765	34	82	<0.001
Working	1,624	90	48	<0.001
Terriers	2,243	57	66	<0.30 but >0.20
Toys	677	19	20	<0.90 but >0.80
Nonsporting	464	18	14	<0.30 but >0.20
Unrecognized	174	7	5	<0.50 but >0.30
Total	19,334	571	571	

[1] Classification of groups of breeds according to reference 13.
[2] Based on a 2 percent random sample of 19,334 licensed dogs in Pittsburgh, 1958.

relationship between dogs' behavior toward other dogs and their behavior toward people.

As mentioned previously in this study, approximately one-third of the bite accidents resulted from dogs biting maliciously without human provocation, one-third were incurred while the victims were playing with or petting dogs, and one-third resulted from human activities which goaded dogs to bite. These findings would seem to suggest that an interaction of overt behavior on the part of people and dogs figures in most (probably well over two-thirds) of the bite accidents.

Licenses and Immunity

Only 767 dogs, or 81 percent, could be traced to owners. The remaining 180, or 19 percent, either were strays or could not be traced. This finding would seem to indicate that Pittsburgh has a relatively large stray dog population. Only 74 percent of the dogs which could be traced to owners had dog licenses. A more active campaign of dog licensing and dog catching is needed to control the stray and unlicensed dogs.

Only 264, or 34 percent, of the animals traced to owners had been vaccinated against rabies. Of these, 57, or 22 percent, had not been given booster injections within the past 3 years. Most dogs (468 or 61 percent) had not been vaccinated against rabies, and 35, or 5 percent, of the owners did not know the status of their dog's immunity. As one might expect, a higher proportion of dogs with licenses had been vaccinated than dogs without licenses. Probably a high proportion of the 180 dogs which could not be traced have not been vaccinated.

Improved vaccines are available for active immunization (*14,15*). Adequate control measures plus mass rabies vaccination of the canine population has been shown an effective means of eliminating canine rabies from a community (*16*). Although no human rabies and only one case of animal rabies have been reported in Pittsburgh or Allegheny County during the past 3 years, numerous cases have been reported from adjacent counties. At the present time, the canine population of Pittsburgh is largely susceptible to rabies and the soil is ripe for a rabies epidemic. On the basis of these findings, a mass rabies immunization program is indicated, and legislation is needed to make rabies immunization a requirement for dog licensure. These recommendations are in accordance with those of the Expert Committee on Rabies of the World Health Organization (*17*).

Discussion

A study of the epidemiology of dog bites in the United States would seem important for the following reasons: between 600,000 and 1 million people are bitten by dogs every year (*1*); about 10 percent of all dog bites produce serious injuries although few result directly in human deaths; dogs are the primary source of human exposure to rabies; although only 10 to 20 people die of rabies in this country every year, about 50,000 individuals receive antirabies treatment (*18*); other diseases are transmissible from dogs to man through dog bites; and an immeasurable amount of anxiety and fear is experienced by parents when their child is bitten by a dog. On the other hand, dogs will probably continue to provide people with much pleasure and companionship. It seems reasonable to believe that many dog bites can be prevented when the facts about how they take place are known.

Inferences about the age, sex, and breed of the dogs were made by comparing the licensed dogs which bit people with the total licensed dog population of Pittsburgh (19,334 dogs). However, among the dogs which were traced there were no significant differences in the age, sex, and breed distributions of the 196 unlicensed dogs compared with the 571 licensed dogs. Therefore, there is reason to believe that the findings in this study may pertain to 767, or 81 percent, of the dogs which bit people. This observation would seem to increase the reliability of the data and support the validity of the findings. Poor reporting did not seem to be a major source of error, as it was felt that most dog bite accidents were reported. Biases in reporting a number of the items were corrected by comparing the victim's statements with the owner's statements. There was a surprisingly high degree of agreement in most instances.

Dog factors would seem to rank along with

human factors in the ecology of dog bites. Environmental factors occupied a relatively minor role. Female dogs inflicted a higher rate of bites per 100 (4.1) than male dogs (2.7). This difference could not be attributed to the oestrous cycle or nursing pups. Unfortunately, the question of spayed versus nonspayed females was not investigated. Young dogs were found more likely to bite people than were older dogs.

Perhaps the most striking finding is that certain breeds of dogs are more likely to bite people than other breeds. In this study, to facilitate analysis of the data, individual breeds were combined into groups of breeds, although there is a danger that the individual breed with a high rate of bites may be obscured by the rates of the other breeds in the group. Working dogs and sporting dogs clearly were reported to bite more people than would be expected. The differences between the expected and reported number of bites for these groups is probably significant. They did not result from age and sex variations within groups, and the circumstances of the bites did not account for these differences. There was not an unusually large proportion of bite accidents involving these breeds in which human acts provoked the dogs to bite. A random check of the records showed that improper classification of dogs by breeds was not a major source of bias. At this time, we are not able to single out individual breeds within the groups which are especially vicious. However, this preliminary study would seem to indicate that such breeds exist.

On the basis of the findings in this study, the following recommendations are suggested to dog owners.

- Try to avoid the combination of young dogs (less than a year old) around young children (less than 5 years old).
- When obtaining pets for children consider the fact that female dogs inflict more bites than male dogs.
- Restrain or dispose of dogs which consistently bite people.
- Immunize dogs against rabies, consulting a veterinarian for the proper schedule.
- Consult a physician in case of a dog bite.
- Obtain a license for each dog.
- Affix an identification tag to each animal's collar, listing the dog's name and the owner's name and address.
- Don't permit dogs to roam at large in a heavily populated area.

Summary

Dog factors associated with dog bites in Pittsburgh, Pa., were studied by comparing the licensed dogs which bit people with the total licensed dog population of the city. Of 19,334 licensed dogs, 571, or 3 percent, bit people during July and August 1958.

Female dogs had a higher bite rate per 100 dogs than male dogs (4.1 and 2.7). The higher rate among female dogs could not be attributed to the oestrous cycle or to nursing pups.

Young dogs, 6–11 months of age, were found more likely to bite people than older dogs. Perhaps this finding is related to young dogs' lack of training and poor adjustment toward people.

Certain groups of dogs were found more likely to bite people than other groups. Working dogs were the chief offenders, with 48 bites expected and 90 bites observed. Also, sporting dogs bite people more often than would be expected. No individual breed could be singled out as especially vicious, but such breeds probably exist.

Some dogs are repeatedly involved in dog bite accidents. According to the owners and the victims, during 1 year between 47 and 83 dogs bit 2 people; at least 16 dogs bit 3 people; 1 dog bit 4 people; 1 dog bit 5 people; and 1 dog bit 8 people.

The findings in this epidemiological study of dog bites provided a factual basis for making recommendations to prevent and control dog bites.

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Florence Rena Sabin

A pioneer in physiology and public health has been selected by the State of her birth, Colorado, as one of its two representatives in National Statuary Hall of the Capitol of the United States (see frontispiece).

Florence Rena Sabin, born in Central City, Colo., November 9, 1871, was the first woman intern to be accepted by Johns Hopkins University, in 1900, after earning a doctorate in science at Smith College; the first woman to be professor in a medical school (histology at Hopkins); and the first woman to be president of the American Association of Anatomists (1924).

Renowned for contributions to the dynamic study of functional physiology, Dr. Sabin was also the first woman to be invited to join the staff of the Rockefeller Institute of Medical Research, where she served 13 years until her "retirement" at 67 in 1938. Then she began one of the most vigorous periods of her career.

As chairman of the health section of Colorado's postwar planning committee and city manager of health and charities in Denver, she led a successful campaign for "Health To Match Our Mountains," which culminated in 1947 with legislative and financial support of a new department of public health, construction of new hospitals, a widened medical school program, increased facilities for tuberculosis management, and a strengthened system of milk sanitation.

Signs and Symptoms

of trends in public health

A full program of progressive patient care has been established at Grant Hospital in Chicago with the opening of a new wing. The hospital now has three 6-bed wards for intensive care and one 18-bed wing for ambulatory self-care. Intermediate care is provided in the remaining wards.

» «

Trachoma in Mexicans in Southern California is under investigation by scientists assigned by the Communicable Disease Center of the Public Health Service.

» «

Properly designed and adequately fitted mouth protectors are urged for all youths engaged in contact sports by Dr. Gerard H. Schoen of the American School Health Association. He quoted a recent survey which showed that among a group of high school football players, 11 percent not wearing mouth protectors suffered dental injury while those with protectors escaped harm.

» «

The world's population is increasing at the rate of 45 million a year, according to the annual report of the United Nations Department of Economic and Social Affairs. The computation is based generally on an estimated annual birth rate of 34 per 1,000 and death rate of 18 per 1,000. Highest life expectancy was found in Norway where girls born now may expect to live to the age of 75, and boys may reach 71.

These and other statistics supplied by member governments are considered by the report's editors to be correct within a range of 75 to 98 percent.

The Declaration of Geneva rather than the Hippocratic Oath was taken at the first commencement exercises at Albert Einstein College of Medicine, Yeshiva University, New York City. Fifty graduating students pledged "not to use their medical knowledge contrary to the laws of humanity" or to "permit considerations of religion, nationality, race, party politics, or social standing to intervene between duty and patient."

» «

The virus laboratory of the division of laboratories, New Jersey Department of Health, is now housed in new quarters at the Madden Building, Donnelly Memorial Hospital, Trenton.

Complete equipment for virus isolation and serologic studies of virus diseases has been installed during the past year, including housing for large and small animals. In addition to diagnostic virology, laboratory areas have been set aside for research tied in with the department's epidemiological services.

E. L. Shaffer, Ph.D., is director of the division of laboratories, and Martin Goldfield, M.D., assistant director.

» «

Public opinion favors spending for medical research, according to a University of Michigan survey. Interviews of 1,500 Americans showed that, given a choice, 54 percent preferred medical research; 32 percent, efforts to combat juvenile delinquency; 7 percent, basic research in the sciences such as physics and chemistry; and only 3 percent, a program to put the first man on the moon.

A cooperative program of medical care for people on public assistance has resulted from joint action by practicing physicians, the department of public welfare, and the county health department in Russell County, Va., Dr. J. W. Jessee of Norton reports.

Three steps initiated the action. A screening facility was set up to determine the medical eligibility of welfare applicants. A medical advisory committee was formed to serve the department of public welfare. And the local health department arranged to coordinate medical services to the indigent sick.

A general medical clinic was opened in 1956 with local funds. State support was added after the clinic was designated as part of a statewide pilot study of coordinated medical care for the indigent sick.

Observations after 3 years of operation indicate there has been definite improvement of interworking relationships, opportunity for control and coordination of medical services to welfare patients, increased use of established health department programs, success in casefinding, and savings in costs both to the patient and to the community.

» «

A comprehensive water pollution abatement plan for New York's Finger Lakes Drainage Basin has been approved by the State water pollution control board. It calls for specific steps by 95 industries and 42 municipalities to bring waters of the basin up to established standards.

» «

Staff nurses are trained in epidemiology and communicable disease control in Butte County, Calif., through a series of lecture meetings featuring the work of the local department of health in a recent outbreak of *Salmonella* infections.

» «

In the absence of equipment or help from a second person, the American Red Cross endorses the mouth-to-mouth technique as the most practical method of artificial respiration regardless of age and cause of cessation of breathing.

CONFERENCE REPORT

Industrial Health Today

Air pollution, radiation exposure, poisons, the impact of sound, and their resultant challenge to current industrial health practices were among the major topics at the 1959 Industrial Health Conference held in Chicago, April 27–May 1.

The conference is conducted as a joint annual meeting of five professional organizations: the American Conference of Governmental Industrial Hygienists, the American Industrial Hygiene Association, the American Association of Industrial Dentists, the American Association of Industrial Nurses, and the Industrial Medical Association.

Of the 109 papers presented at the 5-day meeting of the American Industrial Hygiene Association, 16, selected for public health interest, are summarized here.

Planning for Radiation Accidents

The probability that accidents resulting in serious levels of radiation exposure will increase in the coming decade seems likely because of the tremendous growth in the use of this modality in industry. Prompt notification of the possibility that a radiation accident might have occurred is essential for the most effective handling of the situation. Rapid communication between health personnel and management is vital.

Once the event occurs, it is essential to restrict exposure from sources of radiation outside the body, from radioactivity on the body surface or within the body, or from a combination of these sources.

If radioactive elements are released, they can be disseminated rapidly. Evacuation and closure of the hazardous area must be carried out immediately. The first 12 hours are critical. Diagnostic studies should be instituted and decontamination procedures planned and started at once.

Monitoring of individuals in an emergency requires certain hematological studies as well as careful medical observation. Specific medical therapy depends on the levels of radiation and kinds of contamination found or suspected. Collection of specimens of blood, urine, feces, and breath may be needed to determine what particular radionuclides are at large.

The relationship between the physician and health physicist and administrative problems, particularly in relation to publicity, are especially important and require planning and

direction. If contamination threatens the general public, civic authorities have responsibilities to contain the danger.

Aid in radiation accidents is available from the Atomic Energy Commission and Department of Defense.—EUGENE L. SAENGER, M.D., *College of Medicine, University of Cincinnati, Ohio.*

Experience With Occupational Overexposure to Radiation

Nineteen incidents of excessive exposure to radiation have been reported to the New York State Labor Department since the promulgation of the State industrial code a little more than 3 years ago. Excessive exposure to radiation is defined in the code's rule 38 as a dose in excess of 3 rems during a 13-week period.

Eight of the reported incidents appear to have been false alarms. In seven, reports were based upon an erroneous measurement of exposure due to improper handling of radiation measuring devices. For example, excessive readings on several film badges resulted from their storage in a highly radioactive area. In the eighth incident, prompt evacuation of an area following an accidental spill of strontium-90 prevented overexposure. There was no discernible clinical evidence of injury in any of the eight instances.

The 11 other incidents were produced either through chronic low-level routine exposures ranging from 0.4 to 1.2 rems per week, exceeding the recommended limit of 3 rems per 13 weeks of penetrating radiations from radioactive material; or through acute high-level accidental exposures to X-rays or radioactive materials, with dosages ranging from 30 to 1,200 rems. Acute exposures were fortunately confined to noncritical areas of the body.

In three individuals exposed, radiation burns were determined to have originated after the code went into effect. Remedial measures have been taken in the plants where these exposures were reported.

The factors most frequently responsible for excessive exposures were lack of awareness of the hazard, of proper supervision, of proper work techniques, and of adequate protective devices.—MORRIS KLEINFELD, M.D., AND ALBERT P. ABRAHAMS, *New York State Department of Labor, New York, N.Y.*

Protective Clothing at a Large Atomic Energy Installation

Protective clothing is worn at atomic energy facilities primarily to keep radioactive materials away from the body and to insure that contaminants are not inadvertently removed from controlled areas. This clothing is a vital but costly aspect of any radiological health program.

At the Savannah River plant, the investment in clothing and laundry facilities is sufficient to justify a continuous program for reducing this expenditure without compromising the necessary protective standards. Major effort has been directed toward evaluation and standardization of existing equipment, evaluation and development of new types of garments, and revision of laundering processes.

Projects which were successful in increasing the protective value of garments include:

- Testing and adoption of a new coverall fabric which provides greater protection against penetration of particulate matter.
- Development of water vapor permeability data which are used in the selection and specification of rubber and plastic garments.
- Evaluation and adoption of extra large cloth gloves, cloth shoe covers, and cloth boots which allow for shrinkage and which are fabricated with seams strengthened against holes and tears.
- Requirement of a large strap on coveralls and laboratory coats to permit pocket chambers and badge dosimeters to be worn in a central and consistent location.

Projects which have resulted in substantial savings without compromising protective standards include:

- Use of unbleached clothing.
- Elimination of unnecessary pockets on coveralls and laboratory coats.

Clothing worn in the laboratory at the U.S. Atomic Energy Commission's installation at Oak Ridge, Tenn., is monitored for evidence of radioactivity. Some laundry must be confined as waste, if it is found to be unsafe.

• Recovery of coveralls contaminated to slightly above normal reuse limits to serve as outer "throwaway" garments following work in highly contaminated areas.

• Development of a two-piece plastic suit which is far less expensive than the previously used one-piece suit.

• Development of a process for satisfactorily recovering contaminated surgeons' gloves for reuse.

In addition to continuously evaluating newly developed and marketed products, future work includes establishment of a program to dry-clean and reclaim contaminated leather gloves.

This information was developed during the course of work with the Atomic Energy Commission under contract AT (07-2)-1.—R. W. Van Wyck and H. L. Butler, *E. I. duPont de Nemours and Co., Aiken, S.C.*

Survey of Radiation Received by Dentists and Dental Assistants

A 9-year survey of personnel engaged in dental radiography in New England, when compared with similar surveys of physicians using X-rays, showed that dentists and dental technicians rank third among the health professions in weekly dose received.

The survey was accomplished by using film badges worn on the lapel or carried in a pocket, and an attempt was made to maintain the same relative distance from the floor. Ionization survey meters were used to check the installation and the pattern of scatter.

Analysis of 3,134 badges from 233 dental offices and 3 clinics showed the following results for an average 2-week period:

Exposures (in milliroentgens)	*Personnel monitored (approximate percent)*
0–9	17
10–99	50
100–199	20
200–299	10
Over 300	3

Exposures of more than 200 milliroentgens were due largely to carelessness and the shortcuts taken by technicians working under pressure. Many dental radiography units had no added filtration and most were not properly diaphragmed. Rooms were usually small, thus precluding the possibility of using distance as a protective measure.

A phantom was used to take radiation measurements, but the many applicable variables made it impossible to determine the least hazardous operating position for dental personnel. The only safe place is outside the room. Second choice for safety is a position away from the zone of scattered radiation, less than 120 degrees from the primary and at least 3 feet from the X-ray tube head.

After checking installations for scattered radiation, reevaluation by film badges, proper utilization of filters and diaphragming, and advice to personnel on safer procedures, there was an appreciable decrease in milliroentgens received by the dental personnel surveyed.—CHARLES K. SPALDING AND RUSSELL F. COWING, *New England Deaconess Hospital, Cancer Research Institute, Boston, Mass.*

Engineering Efforts in Noise Control

Modern high-speed equipment, powerful automatic machines, jet engines, and rockets have drawn attention to the need to protect the hearing of operating personnel from destructive effects of noise. Concerted efforts have been organized to define the acceptable limits of noise exposure, to control noise, and to protect personnel.

The risk of hearing impairment associated with any given noise depends not only upon the noise level but also upon the length of exposure. In evaluating a working environment and in choosing suitable steps to reduce exposure to noise for operating personnel, it is necessary to consider noise levels throughout the field of operation, the work schedule, and the movements of the operator.

When a new plant or process is being considered, advance planning helps to achieve effective and inexpensive noise control. A careful choice of machine location, plant design, and construction materials at the planning stage can reduce the noise hazard significantly and may eliminate it completely. Modifications required for noise control can be made more effectively on the chosen machines or processes before installation is completed.

If a plant or process is in operation, noise exposure may be reduced by revising work patterns, by using corrective acoustic design, or by protective devices. Relocation of an operator, even by a few feet, may reduce his exposure to noise significantly or may permit the use of measures which would be ineffective in the previous position. Modifications to a machine or the provision of effective noise shields requires careful design engineering, but basic noise control principles have been developed which can simplify the design procedure.

For example, if the person to be protected is close to the source of noise, an enclosure for the source or even a partial enclosure or a baffle will be effective in reducing the direct sound by reflecting it away from the listener. In this position, however, the addition of acoustic tile to the ceilings or walls will provide little relief since such material will reduce the reflected sound only, and this sound is already low in comparison with the direct sound. Conversely, when the person is far from the source, acoustic absorption spread around the room may be quite effective.

Ear muffs, ear plugs, or similar ear protective devices are generally the least desirable noise control technique because of the inconvenience

and difficulties inherent in obtaining proper fit and adjustment. Sometimes, however, they are the only practical solution.

When processes and machines are intrinsically noisy and their functions cannot be dissociated from their noise output, a realistic answer may be found in the use of automation and remote control.—CLAYTON H. ALLEN, PH.D., *Bolt, Beranek & Newman, Cambridge, Mass.*

Medical Critique of Noise Control

In 1947, there was an abrupt increase in the number of compensation hearing loss claims in the State of New York. Shortly thereafter, many similar claims were filed in New Jersey, Wisconsin, and other States. Despite these developments, the hearing hazard has awakened little concern in a large number of industrial plants.

Improper and unsatisfactory hearing conservation programs may be due to many factors. To mention a few, they include poor planning, noisy testing environments, the use of improperly trained technicians, questionable testing techniques, unsatisfactory recording, and particularly the lack of proper medical supervision.

There are industries which have purchased audiometers and turned them over to nurses or safety personnel with instructions to make "hearing tests." These records are merely filed for use in the event of future claims. No provisions are made for adequate training of the personnel conducting the tests, for medical supervision, or for proper interpretation. Any hearing conservation program without medical supervision must be considered inadequate.

For industrial hearing testing programs, a simple discrete air conduction audiometer properly calibrated and maintained is all that is required. This audiometer may be a small portable or an office model. Additional equipment, such as bone conduction, speech circuits, and masking, are not essential for inplant testing. The hearing test performed should be a pure tone air conduction threshold audiogram, not to be confused with so-called screening tests which use a single- or two-frequency technique and are intended for recheck or periodic examinations.

Poor planning and the use of elaborate equipment and testing procedures lead to unnecessary expense and often to misleading and unreliable information.

There has been considerable misunderstanding of what is meant by "noise exposure" and failure to realize when ear protective measures are indicated. Much of this misunderstanding can be overcome by proper educational campaigns and approaches which will help to reduce resistance to protective steps.—MEYER S. FOX, M.D., *2040 W. Wisconsin Avenue, Milwaukee, Wis.*

Legal Aspects of Noise Control

Granting workmen's compensation benefits in cases of occupational deafness for purely physiological or social loss where there is no loss or impairment of earning capacity has resulted in numerous complicated medicolegal and socioeconomic problems.

The new formula recently proposed by the Subcommittee on Noise of the American Academy of Ophthalmology and Otolaryngology does not make any provision for the nonmedical, legal, and economic factors which must be considered in the establishment of a "disability formula" as distinguished from an "impairment formula."

The medical and related sciences should yield basic data concerning the handicap or impairment caused by hearing loss. It would then become the function of the legislative or administrative authorities to determine at what point and to what extent the handicap becomes a compensable industrial liability within the meaning of the Workmen's Compensation Law. The data should include what is known about the extent of hearing losses among the general population caused by presbycusis, sociocusis, and nonoccupational disease so that in estimating the auditory effect of occupational noise exposure a uniform, corrective factor can be applied, on a statistical basis, to the audiogram to

cancel out the loss which may reasonably be assumed to have been caused by these other non-industrial elements.

Because of the difficulties of proof with respect to etiology and many uncertainties inherent in the problem, it would not be feasible or practical to handle this matter on an individual case basis. In cases of occupational loss of hearing, compensation should be paid only for the hearing impairment which is in excess of the degree of hearing impairment found in the average individual at different age levels among the general population not exposed to harmful industrial noise.

In any suitable disability formula, some recognition should also be given to the extent, if any, to which the employee's hearing impairment affects, or may in the future affect, his earning capacity.

Another question for which no satisfactory legal solution has been found to date is how to allocate compensable liability in the case of exposure to harmful noise in successive employments.—Noel S. Symons, *of the law firm Vaughan, Brown, Kelly, Turner, and Symons, Buffalo, N.Y.*

Experimental Cancers Produced in Rats by Chromium Compounds

Numerous studies have failed to identify the agent responsible for the high incidence of cancers of the lung among chromate workers. A previous study provided highly suggestive evidence that the roasted chromite ore contains a carcinogenic agent. These and other observations indicated that the development of experimental tumors depended on the proper biological availability of chromium to the tissues, determined largely by the relative degree of solubility of the chromium compound present. The present study was undertaken to test the validity of this concept.

A series of chromium compounds covering a wide range of water solubility and including calcium chromate, sintered calcium chromate, sintered chromium trioxide (chromic chromate), barium chromate, strontium chromate, zinc chromate, and lead chromate were implanted surgically in the muscle tissue of the thighs and in the pleural cavities of Bethesda black rats. Each compound mixed with sheep fat was administered to 70 rats, 35 for each site.

Tumors produced in rats by chromium compounds

Compound and site of implant	Number rats living	Number rats dead	Number with tumors at site of implant	Percent of dead with tumors	Percent of tumors in total group	Observation period (months)
Calcium chromate (2,470):						
Pleural	0	35	21	60	60	18
Thigh	13	22	9	41	26	18
Sintered calcium chromate (1,280):						
Pleural	3	32	17	53	49	19
Thigh	7	28	9	32	26	19
Sintered chromium trioxide (1,710):						
Pleural	7	28	20	71	57	17
Thigh	4	31	21	68	60	17
Zinc chromate (610):						
Pleural	23	12	7	58	20	9
Thigh	26	9	9	100	26	9
Strontium chromate (230):						
Pleural	18	17	7	41	20	11
Thigh	21	14	8	57	23	11
Barium chromate (8.5):						
Pleural	16	19	1	5	3	17
Thigh	18	17	0	0	0	17
Lead chromate (<1):						
Pleural	34	1	0	0	0	9
Thigh	33	2	1	(50)	----------	9
Sheep fat:						
Pleural	18	17	0	0	0	18
Thigh	16	19	0	0	0	18

Note: Figures in parentheses show the solubility in water of hexavalent chromium in milligrams per liter.

An equal number receiving sheep fat only were used for controls.

Five months after the material was implanted, the first tumors were observed in those rats receiving calcium chromate, sintered calcium chromate, sintered chromium trioxide, strontium chromate, and zinc chromate. Tumors occurred at the site of implantation in the thigh and in the pleural cavity (see table).

Animals receiving barium chromate and lead chromate developed tumors less frequently and after a longer latent period. The tumors were predominantly sarcomas and were highly invasive. A few intrathoracic cancers were pulmonary squamous cell carcinomas. In the pleural cavity, the tumors were usually adherent to the thoracic wall or diaphragm and frequently involved the lungs and other organs. In many of the animals part of the implanted material was observed embedded within the tumor.

These results, together with available epidemiological and clinical evidence, indicate that chromium is a carcinogenic agent if it is available to the tissue in proper dosage and form. Human lung cancer hazards may be associated, therefore, not only with the production of chromium chemicals and chromium pigments manufactured from chromite ore but also may occur with many other industrial and general uses of chromium metal and chromium compounds. Epidemiological studies on the frequency of lung cancers from such sources and in such industries and environmental conditions are lacking at present. The authors have compiled as a guide for epidemiological surveys a list of chromium products and operations and their industrial and environmental distribution.—W. C. Hueper, M.D., and William W. Payne, *National Cancer Institute, Public Health Service.*

Relationship of Bladder Cancer to Metabolism of Aromatic Amines

Bladder cancer associated with such aromatic amines as 2-naphthylamine is believed to arise not from the original compound but rather from a biochemically changed product present in urine. An understanding of the mechanism of carcinogenesis from such materials would help in devising protective measures and would aid in predicting the probable carcinogenic potential of analogous substances.

For these reasons a major search is on for the carcinogenic urinary metabolite. The remarkable species specificity of the disease has offered one approach to this problem. Only humans and dogs develop bladder cancer when exposed to carcinogenic amines; rabbits, rats, mice, and other animals tested are not sensitive. The most common compounds found in the urine of all species exposed to 2-naphthylamine are the sulfate and glucuronide conjugates of the O-hydroxyamines. We have recently observed two compounds only in human and dog urine, 2-amino-1-naphthol and bis-2-amino-1-napthyl-phosphate; 2-amino-1-naphthol appears to arise from an unstable precursor in these urines. If this precursor is only the identified phosphate conjugate remains to be tested.

The occurrence of these unusual compounds only in the species which contract bladder cancer appears a promising clue in the mechanism of bladder cancer formation.—Walter Troll, Ph.D., *Institute of Industrial Medicine, New York University, Bellevue Medical Center, New York City.*

Epidemiological Findings Associated With Beryllium Extraction

Approximately 100 case histories of patients with alleged beryllium disease have been analyzed by the physicians of the division of occupational health of the Pennsylvania Department of Health. These illnesses were diagnosed by the medical profession over the past 20 years from the approximately 4,000 persons employed in a beryllium extraction plant in Pennsylvania or living in its vicinity.

Sixty cases of chronic beryllium disease were studied following a thorough examination of hospital records, personal contacts with physicians, and interviews with the affected persons or their surviving relatives. These cases were divided into three groups: persons who con-

tracted the disease as beryllium plant employees; persons having contact with work clothes of plant employees; and persons living in the neighborhood of the plant.

Only histories of patients with known chronic illnesses were selected. Figures are not complete since new histories are being added because of the latent period, frequently long in duration, before beryllium disease becomes evident clinically.

A study of air pollution in the plant vicinity was conducted at the same time as the clinical examinations. It was found from routine autopsy that many lung specimens from residents of the plant vicinity contained detectable amounts of beryllium despite the fact that there was no evident beryllium disease.—JAN LIEBEN, M.D., M.P.H., AND FRANZ METZNER, M.D., M.P.H., *Pennsylvania Department of Health, Harrisburg.*

Diethylstilbestrol Effects on Workers

Since 1941, the absorption of diethylstilbestrol has been producing gynecomastia and other symptoms in chemical workers. A suggestion by Dr. K. C. Kohlstaedt led to the development of a bioassay method, modified from that of H. D. Lawson and associates, to measure urinary output of diethylstilbestrol in workers once a week for early detection of excessive absorption.

Ten immature female mice (CF-1 strain) weighing 8 to 10 grams receive 0.2 ml. untreated urine orally on 3 successive days. Two control series of 10 mice each receive 3 similar oral doses of diethylstilbestrol, standard solutions containing 0.06 and 0.18 micrograms per milliliter respectively. On the fourth day, all mice are killed with $CHCl_3$, and the uteri are dissected and weighed in groups of 10 to ± 0.1 mg. Typical average uterine weights relate to dose of diethylstilbestrol as follows: zero dose, 8 mg.; 0.06 μg/ml., 16 mg.; 0.18 μg/ml., 31 mg.

Unexposed chemical workers excreted estrogens below the threshold of the test (0.02 μg. per milliliter). Exposed and imperfectly protected workers showed values ranging from 0.06 to 0.55 (μg/ml.). Earliest symptoms of breast stimulation were seen 1 to 2 weeks after urinary excretion reached or exceeded 0.1 μg/ml.

Elaborate precautions similar to those used in handling radionuclides were required to prevent absorption: isolation in a room with tiled walls, caps, dust masks, coveralls, rubber gloves, entrance and egress through a shower, daily change of clothing, special laundering methods, filtration of exhaust air, and scrupulous cleaning up of spills. Even with this care, certain workers had to be rotated off the job because of early signs of absorption.—R. M. WATROUS, M.D., AND R. T. OLSON, B.S., *Abbott Laboratories, North Chicago, Ill.*

Factory Heat Waves Can Be Broken

Heat relief measures for operating personnel have been undergoing drastic reevaluation and revision. As a result, surprising changes are at work in the design and equipment of new plant buildings. These changes are in a chronic race with the increase in heat production.

Each year more heat is released as equipment increases in size and number. Machine tools are more heavily motored; departments accommodate more machinery. The drive to raise productivity also promotes faster heating rates and greater tonnage output by furnaces in fields of annealing, heat treating, billet heating, and alloying. At the same time, building characteristics are changing in ways that hinder conventional ventilation practices. Long, narrow buildings that have aided cross-ventilation are disappearing and ventilation courtyards are being swallowed up. Furthermore, the vast expanses of glass sash wall construction pour solar heat into buildings; about 6 square feet of clear unshaded window glass can introduce as much heat into a building as a pound of steam.

Thus two opposing forces of industrial importance are meeting in head-on collision. Plant design trends stifle conventional ventilation methods at the same time that more heat release requires more and better ventilation. Indoor heat problems are being cleared up reasonably well by three simple procedures.

In the majority of cases, the cooling agent is air motion or circulation using air fresh from

outdoors. For these summer benefits, outdoor air can be taken in from levels slightly above the roof by a popular type of roof exhaust ventilator that is operated with reverse fan rotation to blow in large volumes of air at extremely economical cost. Locations can be selected to suit hot local area requirements. Refinements, where justified, can include air pattern distribution diffusers that are adjusted by a pull chain installed in the floor.

Severe heat cases involve operations such as molten metal, hot metal furnaces, kilns, and engines. The most severe cases usually involve the same plant operations as in heat shielding, but there is the added problem of high building ambient, or air, temperature. To overcome this combination, controlled air motion is supplied but can be doubled in effectiveness by use of water sprays for evaporative cooling. For scattered problem areas, individual so-called desert coolers serve.—BARTLETT R. SMALL, P.E., *Aluminum Company of America, Pittsburgh, Pa.*

Forecasting Air Pollution

On the premise that it might be practical to alert industrial plants against untimely discharges of wastes to the atmosphere, a procedure for forecasting meteorological conditions which are conducive to high pollution levels over a large area was tested during the fall of 1957 and 1958 by the Weather Bureau Research Station at Cincinnati, cooperating with the national air sampling network of the Public Health Service.

Tests of the alerting system were conducted from 33°N. to 43°N. and 78°W. to 88°W. Air quality measurements were taken on request by selected stations of the national air sampling network. A request was issued whenever the following meteorological phenomena occurred simultaneously and a forecast indicated they would persist for at least 36 hours:

1. Surface winds less than 8 knots.
2. Winds at no level below the 500 mb. pressure level to exceed 25 knots.
3. Subsidence below 600 mb.

During the fall of 1957 and 1958, six periods were observed in which the selected empirical criteria were met. Air quality data were obtained for five of these periods.

Examination of the air quality data for the periods in which the weather was monitored revealed that the highest loadings, with few exceptions, occurred in those periods when the criteria were met. Although derived from limited data, the results indicate that macroscale meteorological phenomena can be used to signify periods of high pollution potential for a large area. However, general application will require interpretation of pollution-potential forecasts in terms of anticipated concentrations of specific pollutants.—L. E. NIEMEYER, *Weather Bureau Airport Station, San Francisco, International Airport, San Francisco 28, Calif.*

Relationship of Street Level Carbon Monoxide Concentrations to Traffic Accidents

In Germany and the Scandinavian countries, investigators have reported extensive observations concerning carbon monoxide exposures insufficient to cause subjective symptoms but which affect the cardiovascular, endocrine, and respiratory systems, the blood, and the central nervous system, causing disturbances of vision, hearing, speech, and the reflexes.

Since a disturbance of vision and reflexes can be predisposing to traffic accidents, research was begun in 1956 to determine whether carbon monoxide as an atmospheric pollutant may be hazardous in urban areas.

To determine the CO in the atmosphere, three recording infrared CO analyzers were set up at various locations in Detroit. The full-scale reading of each instrument was 100 parts per million with reliable readings as low as 1 ppm. For a period of 27 weeks, a recorder was located on a depressed highway within the city. The data obtained at this station showed CO readings ranging from 0 to 100 ppm with a median of approximately 8 ppm. Another recorder was placed in a busy neighborhood shopping area for 58 weeks. The CO readings at this location ranged from 0 to 100 ppm with an approximate median of 10 ppm. For 21

weeks a recorder was operated in downtown Detroit and, here again, the CO concentrations ranged from 0 to 100 ppm with a median of approximately 9 ppm. The CO in the atmosphere of the residential area was sampled for 18 weeks. These readings ranged from 0 to 29 ppm with a median of only 2 ppm.

Data obtained from these infrared analyzers were tabulated first by quarter hour and then by hourly intervals, and then correlated with other factors, such as traffic count and meteorological conditions, which were also recorded on an hourly basis. From these data, we are attempting to predict the conditions which permit dangerous concentrations of carbon monoxide to be created in the atmosphere.

Another phase of the study included taking blood samples from drivers and pedestrians involved in automobile accidents to determine the percentage of CO saturation. A total of 227 blood samples have been analyzed and the results ranged from less than 0.5 to 31.5 percent saturation with an approximate median of 1.7 percent.—GEORGE D. CLAYTON, *George D. Clayton and Associates, Inc., Detroit*, WARREN A. COOK, *School of Public Health, University of Michigan, Ann Arbor*, AND W. G. FREDRICK, SC.D., *Department of Health, Detroit.*

Air Pollution Inventory

In an effort to evaluate specific levels of emission of air pollutants characteristic of industries in Michigan, a door-to-door survey of industrial establishments was conducted in certain portions of Wayne, Macomb, and Oakland counties by the Michigan Department of Health in cooperation with the Public Health Service. The total emission, exclusive of combustion resulting from power generation and heating, amounted to 976 tons per day from an estimated 80 percent of the contributing establishments surveyed.

The study was concerned with the industrial process effluents, and accordingly, all types of manufacturing plants were included, with the exception of domestic and commercial establishments, transportation facilities, and power generation facilities.

Analysis of the data indicates that the steel mills in the area account for more than half of the total pollution load, with automobile manufacturing, petroleum refining, inorganic chemical manufacture, gasoline and oil storage and handling, the manufacture of concrete and concrete products, and the manufacture of asphalt, all contributing lower but nevertheless large amounts of contaminants to the atmosphere.

The study obtained a complete inventory of air pollutants by industrial category, specific process giving rise to the pollution, composition of the pollutants, and the amount of material emitted. Industrial categories are tabulated and numbered in accordance with the new Standard Industrial Classification Manual (U.S. Bureau of the Budget, 1957).—BERNARD D. BLOOMFIELD, *Michigan Department of Health, Lansing.*

Five Years of Continuous Air Monitoring

Since May 1, 1954, outdoor air at roof level of a six-story building on the University of California campus has been monitored continuously for particulate material with the AISI smoke sampler. The instrument filters twelve 2-hour samples per 24 hours (about 30 cubic feet per sample). The interpretation of darkening of the filter paper is based on photometric light transmission through the soiled paper and finally recorded as COH units per 1,000 linear feet of air through the filter.

On the average, the 5-year data show a consistent maximum of particulate pollution near midday on all days of the week. The average 24-hour pollution is lowest on Sundays, highest from Tuesday through Friday, and at an intermediate level for Saturday and Monday.

This difference is clearly demonstrated when the average data for these several days of the week is plotted on a log probability graph as suggested by analysis of results from the national air sampling network. Compilation of the filter-soiling data by this technique strongly indicates that the average information is internally consistent except at low COH readings.

Seasonally, the record shows relatively high pollution during the months of October

through January, relatively clean air from March through August, and intermediate results in the other months. When plotted by the log probability method, the seasonal data were not correlated so satisfactorily as were the annual data.

Since observations during the first 3 years were essentially similar both in annual average and in correlation by the log probability method, they have been used as a baseline for comparison of subsequent annual trend. The fourth year showed significantly less pollution than the baseline years. An average decrease of 25 percent is attributed more to meteorology than to inauguration of the area's first air pollution control regulation. The fifth year of observation, starting May 1, 1958, showed a return of the average pollution toward that of the baseline years.—BERNARD D. TEBBENS, Sc.D., *University of California, Berkeley.*

Disability Days in the United States, 1957–58

As a result of illness and injury, workers with family incomes under $2,000 per year lost an average of 10.3 days from work during the 12 months ending June 30, 1958, as compared with a loss of 5.9 days for those in families earning $7,000 and over, according to the latest of a series of published statistical reports issued by the U.S. National Health Survey, Public Health Service. The data, applying to the total civilian population of the country, exclusive of persons confined to long-term institutions, are derived from continuing household interviewing with a representative sample of the population, conducted for the Service by the Bureau of the Census.

An inverse relationship existed also between income and other forms of restricted activity, such as days in bed due to illness and injury.

Workers 65 years of age and over lost about 11 days from work compared with 8.4 days for those in the group 45–64 years and 6.3 days for those aged 17–44. City children lost 9 days from school, on the average, as a result of illness and injury; rural nonfarm children lost 7.8 days; and farm children lost 7.3 days. However, farm children 15 and 16 years of age lost about 10 days from school as compared with 6.5 days lost by urban children of these ages.

Respiratory illnesses as a group were responsible for 40 percent of all activity restriction and half of all days in bed. Circulatory diseases ranked second in terms of total volume of disability, followed by injuries and their chronic effects and then digestive diseases.

The publication contains additional data on the relation between disability and various characteristics of the population, giving details by calendar quarter. Copies of the report, "Disability Days, United States, July 1957–June 1958," PHS Publication No. 584–B10, may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., at 40 cents a copy.

By reviewing the historical background of hospital regionalization, researchers are aided in applying the techniques of industrial engineering to the problem of improving the efficiency and economy of hospital services in geographic regions.

Hospital Regionalization in Perspective

MILTON I. ROEMER, M.D., and ROBERT C. MORRIS, M.S.

REGIONALIZATION of hospital services has become a popular theme in the United States. Since 1947, State master plans for hospital construction under the Federal Hill-Burton Act have been based on this concept. Regional and metropolitan hospital councils are set up in 11 States. Insurance commissioners, faced with rising Blue Cross premiums, have called for regional coordination of hospitals to reduce costs (*1*). A series of conferences has been held across the Nation on planning hospital systems, in which regional organization is the key problem. Seasoned hospital leaders call for more research in the field (*2*).

But the meaning of "hospital regionalization" is not always clear. To some it is simply an approach to making decisions on where hospital buildings are needed and how many beds should be provided at each location. To others it means a systematic scheme for cooperation among hospitals in their day-to-day operations. To a European, it usually implies unified management of a network of hospitals in a geographic region. And there are other defined points in the range of possible meanings.

In fact, hospital regionalization has had different meanings historically, and it has different meanings today in different parts of the world or different places in the United States. Perhaps the only common note in all the interpretations is an element of coordination, in planning construction or in actual operations or both, among a group of hospitals in a geographic region. Ways of expressing this coordination vary greatly. The intention is always to give the hospital program a rational structure in order to improve the quality of service or reduce the costs or both. But whether this goal has actually been achieved by regionalization efforts or how it might be best achieved are large questions to which we do not have answers.

If we take a closer look at the hospital regionalization movement, we may gain perspective in designing research to answer these questions.

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Historical Background

It is customary in the United States to trace the origin of the hospital regionalization idea to the program of the Bingham Associates Fund operating in Maine since 1936 (*3*). Here was an effort to bring first-class modern scien-

tific medicine to residents of the rural areas and small towns of Maine. The emphasis was on improved resources for medical diagnosis. The base center is in Boston, where difficult cases are sent. Then there are two regional or district hospitals in the principal cities of Maine and 38 cooperating small community hospitals around them. More recently western Massachusetts has been added to the program. In this area four larger hospitals, lying close together, jointly serve as a regional center for 10 smaller community hospitals. Laboratory specimens and X-ray films are sent from the community hospitals to the regional centers for examination, and consultants go outward from the centers to advise the rural doctors. Physicians are encouraged to come to the centers for postgraduate education. Consultation is also offered in nursing, dietetics, medical record-keeping, and other aspects of hospital administration.

This program, with its two-way flow of patients and services, now the hallmark of the regionalization concept, was built with outside philanthropic support. Certainly the quality of services in the smaller hospitals has been improved, but we have little, if any, idea of the relative costs and whether the same end might be served in other less expensive or more effective ways.

The basic idea of hospital regionalization, however, is much older than the Bingham program. In Denmark, around 1912, the decision was made to avoid further building of rural hospitals and to bring patients with complicated illnesses from rural areas to the central hospitals. A network of institutions was developed, centering in Copenhagen and branching out to the whole country (*4*).

In 1920, there appeared an English study on improving hospital services which described the basic scheme embodied in the British National Health Service 28 years later. The Dawson report called for establishment of a network of hospitals within which all services could be integrated. It defined primary and secondary health centers and recommended that the smaller units, staffed mainly by general practitioners, be supervised by the larger ones, staffed mainly by specialists. The report even sketched prototype centers, showing buildings and layouts and listing services to be performed (*5*).

Military medical establishments have long been organized on a regional scheme, with base hospitals, division or theater-of-operation hospitals, and field stations. Highly systematized, of course, these hospitals demonstrate the feasibility of actual administration of many institutions by a central authority.

Colonial governments have likewise operated hospital systems through central authority. In Asia and Africa, there are capital and district hospitals, with small health centers or mobile clinics at the periphery. Countries liberated from colonial domination, such as India or Indonesia, have usually retained and developed these regional hospital networks.

With one or two exceptions, Catholic sisterhoods do not operate regional hospital networks, but they have long exercised central authority over certain aspects of their hospitals which may be located in scores of far-flung communities. Funds are pooled which may be channeled to provide construction and equipment wherever it is most needed, and uniform administrative policies are usually enforced.

These are expressions of the hospital regionalization concept originating many years ago. In fact, if we think of regionalization as a range of activities, we must go back even further. For any step of a hospital from isolation and self-sufficiency toward interdependence with other agencies or organizations is fundamentally a move in the direction of regionalization.

Thus we can visualize a hospital in colonial America, such as the Pennsylvania Hospital in 1751, as an institution quite alone. The staff may not have grown their own food for hospital use, but surely they made most of their own bandages and supplies. There was, moreover, little to be purchased from the commercial market. There were ideas brought from Europe, but their implementation was entirely up to the small staff working in this solitary structure.

As other hospitals were established, as industry grew, as medicine developed, the hospital obviously became less isolated. Equipment and supplies were produced by industrial companies. Educational institutions trained skilled personnel needed to staff the hospital.

A public health laboratory did tests on hospital patients. A State agency was given legal authority to approve certain aspects of hospital construction or operation. Money to support services for certain beneficiaries was derived from diverse public and voluntary agencies. Associations of hospitals were formed for educational and promotional purposes.

In different countries, this process of dynamic inter-relationship among hospitals has evolved in different ways and to varying degrees. In general, the process has gone further in countries where governments at all levels, national, provincial, or local, have become largely responsible for the ownership and operation of hospitals. This is, indeed, the predominant pattern in Europe, Latin America, Asia, and in fact the entire world outside the United States and Canada (*6*).

Even in the United States, however, the regionalization process has been clear and gaining momentum. Much of it has been on a casual, spontaneous basis. Patients are transferred from one hospital to another. Equipment is sometimes lent. A radiologist based in one hospital interprets films sent by another. A blood bank in one hospital sends a pint of blood to another.

Other expressions of the process toward integration and coordination of hospitals have been more formal and systematic. The Bingham program has been mentioned, and it is historically important not only for the specific mechanisms it pioneered but also for the attention it focused on the need for improved medical care in rural areas.

As America has become industrialized and urbanized, the rural areas have, in a sense, been left behind. The same is true all over the world. A special consciousness of the problems of rural medical care emerged in the 1930's. The first conference on rural medicine was held at Cooperstown, N.Y., in 1938. The Bingham program in Maine got started. The Commonwealth Fund launched its program of building rural hospitals and supporting medical education for rural youth. Improved public health organization in rural counties was promoted. The U.S. Department of Agriculture started its medical care program for low-income farmers (*7*).

It was during World War II that the regionalization idea matured as an approach to improved hospital service for rural people. Public understanding grew and plans were made for a federally subsidized construction program. In 1945 the Commonwealth Fund promoted the Council of Rochester Regional Hospitals (*8*). Immediately after the war, in 1946, the National Hospital Survey and Construction Act was passed, providing not only funds to subsidize hospital construction but requiring a master plan to be drawn up by each State establishing priorities for different localities. Virtually everywhere the rural areas received top priorities because their relative bed shortages were greatest (*9*).

Under the impetus of the Hill-Burton Act, planning groups studied bed needs in all the States. A formula calling for 4.5 to 5.5 general hospital beds per 1,000 population in a State made planning for construction purposes relatively easy. Planning for coordinated hospital operation, however, was not so easy. Attractive charts portrayed networks of regional, district, and community hospitals in each State, implying the classic two-way flow of patients and services. In practice, the State hospital construction agencies were seldom in a position to bring life to the charts in day-to-day hospital operation.

Coordinated Operations

Nevertheless, the introduction of rationalism into construction planning stimulated voluntary groups to do something about coordinating hospital operations.

National attention was focused on the regionalization experiment around Rochester. Elsewhere in New York State regional hospital councils were organized, not simply to process applications for construction funds but to promote interhospital cooperation (*10*).

State hospital associations became organized or revitalized. They conducted educational and informational programs for their members. Training institutes were held for hospital trustees and administrators as well as for nurses, dietitians, medical record librarians, laboratory technicians, and business office personnel. Uniformity was introduced into ac-

counting practices so that hospitals could deal effectively with third-party payers, such as governmental welfare agencies or Blue Cross hospital insurance plans.

The hospitalization insurance movement did a great deal to bring autonomous hospital administrations together. Through boards of directors of regional Blue Cross plans, hospital advisory committees, and other mechanisms, administrators discussed common problems of hospital operation. Many of these problems are expressed ultimately in per diem costs which the prepayment plan is expected to meet. To sell Blue Cross insurance policies, premiums must be kept as low as possible, and yet premiums are based on hospital operating costs. While costs have indeed been rising, in line with the continued improvement in the content and quality of hospital service, the Blue Cross program in recent years has exerted moderate pressure toward economy and efficiency in hospital operation.

It is true that some observers doubt if paying agencies are doing enough to induce economical operation of hospitals. It is even claimed that prepayment has led to extravagance. The challenge of the State insurance commissioners has been mentioned. Representatives of organized workers, who make up a large proportion of the Blue Cross membership, have been skeptical of the efficiency of hospital administration. In any case, public pressure created by a vast extension of prepayment for hospital care is doing much to bring hospitals together to explore common problems of effective administration.

One expression of this is the organization of joint purchasing arrangements. While the development is still modest, in some large cities hospitals have agreed on standard specifications for linens, laundry supplies, antiseptics, certain drugs, and the like, and have achieved lower prices through mass purchasing. The Hospital Bureau of Standards and Supplies, Inc., is a national organization devoted to this purpose. A nonprofit organization, it purchases many commodities for its hundreds of members, does product testing, and issues informational bulletins. Similar group purchasing activities are conducted by the hospital councils in Rochester, N.Y., and Harrisburg, Pa., by the Federation of Jewish Philanthropies of New York City, and by others. The purchases made in this way, however, usually constitute only a small percentage of the total made by the cooperating hospitals (*11*).

Another measure of cooperation is the pooling of resources for educating nurses. Certain types of didactic instruction are given to the student nurses of one hospital in the training school of another. Students from many general hospital schools of nursing may receive practical training in mental disease, pediatrics, or obstetrics in "affiliated" hospitals specializing in these fields. In Saskatchewan, Canada, in Massachusetts, and elsewhere, centralized lectures for students from many nursing schools have been given in universities.

Medical schools have taken the initiative in a number of places to promote postgraduate education of physicians through the local hospitals in a region. Programs around the medical schools at Buffalo, Richmond, New Orleans, and Berkeley have been outstanding. Rotation of interns and medical residents from a university hospital among several surrounding community hospitals is a growing practice which helps elevate the quality of service in the smaller institution while it gives the young physician insight and experience in a simple grassroots setting (*12*).

Regional and metropolitan hospital councils with full-time staffs in the United States have increased from the first one at Rochester, N.Y., in 1945 to 23 in 1958 (*13*). Their functions vary greatly, but they all represent a pooling of interests by several institutions to achieve improvement in hospital service. The majority of the councils have been organized in large metropolitan cities, where a dozen or more hospitals are found. Their scope of activity changes from year to year, but there has been a clear tendency to progress from an original primary concern with construction planning to the wider problems of the content of hospital service.

Even so, hospital council activities are still oriented more to administrative problems than to elements of direct patient care (*14*). Programs depend on council members and their needs of the moment. While the Syracuse council, for example, regularly summarizes

vital statistics for hospitals of the region, it also does many one-time jobs, such as preparing a booklet to recruit young people for work in the hospital field. The Buffalo council supplies a clearinghouse for employment. The Philadelphia council does much to encourage uniform accounting procedures. The Harrisburg council is now deeply involved with reorganizing activity to comply with the Pennsylvania Insurance Commissioner's ruling of 1958 (*1*). The Chicago council is making arrangements with the telephone company and the many local fire and police departments for coordinated hospital action in the event of disaster. The Swift Current council in Saskatchewan provides consultant services in X-ray technology, pharmacy, dietetics, and accounting to its member hospitals (*15*).

Thus, hospital councils are in a stage of vigorous growth. Aside from their basic services, they are laying the groundwork for greater cooperation among sovereign hospitals in the future.

Evolution of interhospital cooperation to the point of unified management of several institutions has occurred only in a handful of places in the United States. Federal hospital systems for veterans, Indians, merchant marines, and similar groups under the Veterans Administration, Public Health Service, and other agencies, are, of course, highly rational. These programs, however, started out on a centrally organized basis under uniform rules and regulations. They do not include community hospitals open to all persons.

The closest thing to regional management of a network of community hospitals is seen in the Miners Memorial Hospital Association of the United Mine Workers of America. Supported by the welfare and retirement fund of this union of coal miners, the association operates 10 hospitals in the Appalachian Mountain States. There are regional and peripheral hospitals in the system. Authority is centralized with a branching-out of delegated responsibilities. Functions involving direct patient care are, of course, locally based, while supportive activities, such as accounting and payroll, specialized plant maintenance, purchasing, and staff hiring are done regionally for the entire group. Financial functions are centralized to an even further degree; they are performed with electronic equipment at the United Mine Workers headquarters in Washington, D.C. (*16*).

In the Adirondack section of New York, there is a group of three small hospitals, set up by the Noble Foundation, under single management. Some church missions operate a network of small hospitals in the southwestern United States. In western Pennsylvania, the hospital division of Grenoble Hotels, Inc., is a private organization engaged in the business management of 11 general hospitals under voluntary auspices. Five independent hospitals in Newark, N.J., have just consolidated their administration as the United Hospital Association.

The Commonwealth of Puerto Rico, with the support of the Rockefeller Foundation and the Public Health Service, is developing a regional hospital system under central direction. A large regional center, 3 district hospitals, and about 14 small community hospitals are in the network. Not only is the management of all these hospitals unified, but even medical services throughout the region are supplied or directed by a staff of qualified specialists located at the regional center (*17*).

Discussion

This, then, is a brief review of where we stand in the United States in the broad range of hospital regionalization activities. A great deal is going on and established ideas of hospital services are obviously in ferment. Yet the surface of the possibilities of regionalized hospital services through teamwork in natural trading regions has hardly been scratched.

The chief determinants of the degree of interhospital cooperation are philosophical and technical. The philosophical or ideological determinants are found, of course, in our whole system of free enterprise in health service. They include the existence of two types of sovereignty: the autonomy of the boards of directors of voluntary hospitals and the independence of the practicing physicians who staff the hospitals.

We have seen how small bits of these sovereignties have been yielded through increased

cooperative activities among hospitals. Professional independence also has been modified by the widening group discipline within the medical staff organization in hospitals. Appointment of full-time chiefs of clinical services, centralized medical audit procedures, diligent tissue committees, and limitations of privileges have all helped to introduce a collective conscience into the practice of medicine in hospitals.

These two levels of sovereignty are central features of American health service, and they will doubtless be part of our life for a long time. Yet we are finding that cooperation and teamwork among hospitals does not reduce the dignity of the individual patient, doctor, board member, or administrator.

It is, however, the second determinant of any interhospital cooperation, the technical aspects, that will ultimately be most decisive. How much is really to be gained in effective hospital service by more highly organized relationships among institutions in a region? How much can the quality of care be improved by joint action and how much can costs be reduced?

To answer these large questions, they must be broken into many smaller parts. There are perhaps 15 to 20 principal activities involved in hospital service: nursing care, laboratory service, dietetics, business management, and plant maintenance, to name only a few. Under each of these are dozens or even hundreds of subdivisions. The activities in a laboratory service, for example, include the establishment and maintenance of equipment, the supervision and judgment exercised by a pathologist or laboratory director, the training of technicians of many types, the procedures for doing hundreds of tests, the review of technical performance to assure accuracy, the issuance of reports, and the like. Certain laboratory examinations, moreover, are very complex and can be done only in highly technical centers, while others are simple and can be done in the most modest setup.

If the advantages of regional cooperation are to be evaluated, each of these many units of hospital service must be considered objectively. Measurements must be made in which cost is one dimension and patient need another. Under the latter, one must consider the frequency of need for a specific service and the importance of time. A corollary of time is distance and the feasibility of transportation.

These questions are familiar in other contexts, especially in the organization of industry. They are the bread-and-butter problems of students of production and industrial engineering. Are there secrets in American technology which have not been applied to the production and distribution of health services?

There is need to take a closer look at the organization of hospital services in geographic regions from the viewpoint of technical effectiveness. One must not overlook the patient, because his welfare must always remain in the center of the picture. One must likewise not lose sight of ideological realities in American culture. But research focused on the technical aspects of hospital regionalization is urgently needed to evaluate properly the advantages to be gained through cooperative efforts.

If clear-cut technical advantages to specific forms of teamwork among hospitals can be shown, half the battle will be won. To the extent that gains are demonstrable, the American mind usually finds ways of application. If more highly developed expressions of hospital regionalization can be shown to yield better hospital services at the same or lower costs than prevail in the United States today, we are bound to find ways of implementing these approaches which will be philosophically acceptable and consistent with our social values.

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Career Opportunities

Columbia University School of Public Health and Administrative Medicine has announced an institute on new developments in psychiatry to be held November 18–19 in Syracuse, December 2–3 in Albany, and December 16–17 in New York City this year. Enrollment is open to personnel in national, State, and local health departments, in voluntary health agencies, and in family service organizations. Information may be obtained by writing to Program of Continuation Education in Public Health, 600 West 168th Street, New York 32, N.Y.

The University of Michigan and the University of Minnesota Schools of Public Health will hold an institute on prevention and management of handicapping conditions in infancy and childhood, November 16–20, 1959, in Ann Arbor, Mich., sponsored by Michigan and Minnesota State maternal and child health and crippled children's programs under a grant from the U.S. Children's Bureau. Seminars and discussions on extent and distribution, pathogenesis, prevention, recent advances in management, and program planning and evaluation are a part of the program. Eligibility is limited to staff members in States in Regions V and VI of the U.S. Department of Health, Education, and Welfare. Further information may be obtained from Dr. Donald C. Smith, associate professor of maternal and child health, University of Michigan School of Public Health, Ann Arbor, Mich., for Region V, and Dr. Helen M. Wallace, professor of maternal and child health, University of Minnesota School of Public Health, Minneapolis, Minn., for Region VI.

Meals-on-Wheels Projects

MEALS-ON-WHEELS, a practical answer to the problem of feeding care for the aged and handicapped, has been adopted as a health service by a number of communities. These projects recognize that malnutrition is one of the chief causes of illness in the elderly person. Improvement in diet often results in recovery from physical disability.

The meals-on-wheels project in Columbus, Ohio, began in 1956 with voluntary contributions collected by the Columbus Federation of Women's Clubs. At that time, an estimated 400 persons in the city more than 65 years of age could not prepare nourishing meals for themselves.

So that no one would be denied the service because of inability to pay the entire cost, a sliding scale based on income was applied to determine the amount to be paid by the client.

Three plans were used to determine what recipients were to pay for the service. In plan A, public assistance recipients pay up to 80 cents daily, and other needy persons pay some portion of the cost. Under plan B, nonindigent, elderly, or handicapped recipients pay $2 daily. In plan C, hospital patients returning to their homes who need the service temporarily until recovery pay $2 daily unless they qualify under plan A.

The menu was planned by a member of the Columbus Dietetic Association. The meals, prepared and packaged by a quality restaurant, consist of a dinner of meat, fish, or poultry, a vegetable, salad, bread, butter, dessert, and milk; a supper of a sandwich, milk, and fruit; and a snack of fruit or juices with a sweet roll or ready-to-eat cereal. Weekday deliveries are made by four taxicabs with separate routes.

From April 1957 to January 1958, 742 meals under the payment plan of $2 per day, and 1,922 meals under the payment plan of 80 cents per day were served to recipients.

Hospital patients were referred 1 day or more in advance by the physician or social service of the hospital. The recipients ranged from 45 to 94 years of age; 15 were over 70 years of age; and 9 were over 80.

Most of the recipients were receiving regular medical attention. Four persons were receiving regular services of a visiting nurse. Most lived alone in a single room. While a few had adequate cooking facilities, they lacked the physical ability to use them.

The staff donating voluntary services was composed of a full-time director; a bookkeeper (half day a week); three investigators, a collector, and two nutritionists (4 hours a week each); four drivers for Sunday and holiday delivery and two casework supervisors (3 hours a week each); and 12 committee workers for publicity (2 days a month).

The meals-on-wheels project in Rochester, N.Y., providing food for "shut-ins" over 45 years of age has been in operation for more than a year.

The project, begun April 16, 1958, is administered by the Visiting Nurse Service of Rochester and Monroe County on a contract basis for the bureau of chronic diseases and geriatrics of the New York State Department of Health. It is a 3-year pilot study of one type of community health service, domiciliary feeding of the aged, to enable them to live independently.

At the end of the project, a manual based on the study will be prepared to assist other communities in setting up similar projects. Part of the pilot plan is the evaluation of the service with respect to nutrition, cost of operation, administration, medical problems, satisfaction of community needs, and technical aspects of preparation, packaging, and delivery of food.

Within an hour at midday, 5 days a week, 5 private automobiles, each manned by 2 volunteers, deliver and serve food for 2 meals to approximately 8 to 10 clients, a total of 40–50 persons served daily. The meals, a hot dinner and a cold high-protein sandwich supper, are

prepared and packaged at the specially equipped kitchen which VNS added to its headquarters in the heart of Rochester. Menus are planned by the staff nutritionist of the Visiting Nurse Service, and special diets, such as low-sodium and diabetic, are provided on physicians' orders.

The charges range from 50 cents to $1.25 per day, with the "adjusted fee" scaled to income. Charges are payable in advance by the month on a signed agreement basis between the client and the association. It is a business-like, dignified arrangement, and appears to be acceptable to the clients.

The maximum number that can be served at the present time with the association's staff, equipment, and geographic and traffic limitations is about 50 persons. The project is generally working at capacity, although the number of clients varies. Because of basic requirements and effective screening prior to service by the public health nurse, the large number of applicants thins out to a small number of eligibles. The association has been able to care for all who are approved.

The first annual report shows that the clients numbered 143 and ranged in age from 45 to 96 years, with an average age of 76.5 years. There were 2½ times more women than men. Ten couples were served.

The number of days' service per client ranged from 1 to 253 days; the average was 58.2. All paid something more than 70 percent of the full fee. There were 91 regular diets and 52 special, on doctors' written prescriptions. Medical care was provided by private physicians to 115 of the 143. Relatives referred about 28 percent; the rest were referred by physicians, hospitals, social agencies, or the clients themselves.

The Rochester Visiting Nurse Service has played host to many visitors and observers, including public health workers attending a New York State health conference.

Diabetes Casefinding in the Virgin Islands

A diabetes casefinding campaign, combined with venereal disease testing, was conducted in the Virgin Islands in the spring of 1959 by the Islands' department of health assisted by the Public Health Service. Lasting from March through June, the islandwide screening program offered diabetes blood tests to an estimated 10,000 to 15,000 out of the total population of 24,000.

This was the first time mass screening for diabetes was done in the Islands of St. Croix, St. John, and St. Thomas. Besides discovering hitherto unknown diabetics and bringing them to treatment, the campaign will supply data on the prevalence of the disease in the Islands. These data are currently being processed.

Blood tests were offered all persons over 15 years of age, but special appeals were made to persons most likely to have diabetes, such as relatives of diabetics, parents of babies of large birth weight, the obese, and adults over 40 years old. Public cooperation was stimulated by newspaper stories, flyers, radio broadcasts, and, via sound trucks, talks on the disease and its disabling effects if untreated.

Screening was carried out at fairs and other public gathering places. Industrial workers were tested during working hours and health department workers made door-to-door home visits to accommodate those desiring the test. The Hewson Clinitron, designed to perform the Wilkerson-Heftmann blood sugar screening test, was used in the program. At capacity the machine can complete 120 tests per hour.

Asian Influenza in High School Students

KENNETH D. ROGERS, M.D., and HORACE M. GEZON, M.D.

IN THE FALL of 1957 throughout Allegheny County, Pa., there was a sudden rise in the prevalence of acute respiratory infections accompanied by systemic symptoms and signs. Because of the forewarning that the Asian variant of influenza type A was likely to become epidemic and because the symptomatology of the prevailing illness was consistent with that of influenza, many of the cases were diagnosed clinically as Asian influenza.

However, as in any epidemic the question arose as to whether all of the acute illnesses had a common etiology or whether several types of illness were concurrent. In this particular epidemic, it was of interest to know which children had not been infected so that susceptibles could be immunized when supplies of vaccine became available. Information concerning attack rate in this population was also desired for estimating the likelihood of a second epidemic later in the year.

During the epidemic there was a high rate of absenteeism in the high schools of the county. A large number of students in several high schools answered a questionnaire concerning characteristics of any illness they had experienced during this period, and many of these students were studied serologically for the presence of specific antibody against the Asian variant of influenza type A. During the same time period, virus isolations were made in the Allegheny County Health Department laboratory from throat washings and autopsy specimens obtained from patients with acute respiratory disease. Finally, in an attempt to determine if the disease spectrum observed during the epidemic was unique, a repeat questionnaire survey of illness was made in one high school in the fall of 1958.

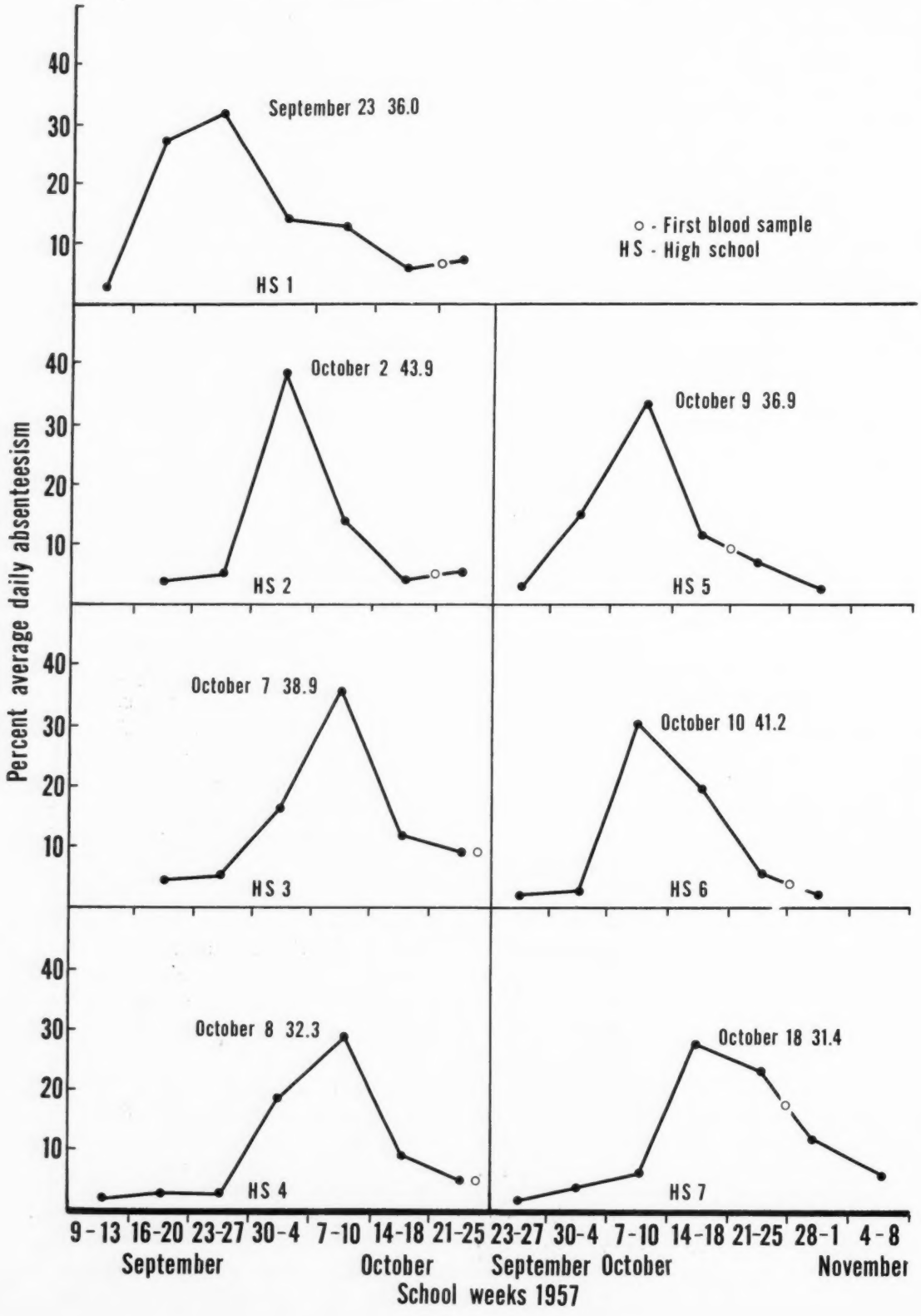
Dr. Rogers is associate professor of maternal and child health, and Dr. Gezon, professor of epidemiology and microbiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pa. *The study, partially financed by grants from the Pennsylvania Department of Health and the Children's Bureau, Department of Health, Education, and Welfare, was carried out with the cooperation of the Allegheny County Health Department.*

Blood Samples and Illness History

A total of 953 students in seven high schools distributed over the five county health districts were studied. In six of the schools samples were small in number and not selected in such a way as to make them representative of the whole school populations from which they were taken. In the remaining one, Dormont High School, the entire enrollment of 679 students answered questions concerning illness, and 429, or 63 percent, contributed blood samples. Therefore, most of the observations in this study were made on the Dormont school population.

From 10 to 31 days following the peak of absenteeism in each school, student volunteers gave blood samples and, at the same time, answered a simple questionnaire about incidence, duration, and symptomatology of any illnesses experienced in the preceding 30 days. Symptomatology was reported by both the student's written description of illness and a simple checklist of signs and symptoms likely to be present in illnesses of the gastrointestinal, respiratory, or central nervous systems. One year after the first illness history was obtained, the Dormont students were questioned concern-

Figure 1. Average daily absenteeism by percentage of enrollment in selected high schools, Allegheny County, Pa., September–November 1957



ing illness during the preceding nonepidemic month, September 24–October 24, 1958.

Fourteen to 24 days after the initial blood samples were obtained, additional samples were given by part of the original group. Dormont students who gave blood specimens a second time were chosen in approximately equal numbers according to the time and type of their experience during the epidemic period—not ill, ill and absent at the beginning of the period, ill and absent toward the end of the period, and ill but not absent. Second specimens were obtained from volunteers in other high schools without reference to their previous history.

Laboratory Materials and Methods

Serums. The serum was separated from whole blood on the day the specimen was obtained and stored in rubber-stoppered glass tubes at −10° C. The serum was thawed, diluted 1:20, and inactivated at 56° C. for 30 minutes just prior to testing. Paired serum specimens were tested at the same time. Single serum specimens were tested in large groups with appropriate positive and negative serum controls.

Complement fixation (CF) test. A modification of the standard Kolmer technique was used to detect antibodies against virus of Asian variant influenza type A. The antigen was prepared from pooled chorioallantoic (CA) and amniotic (A) fluid of infected embryonated eggs. Influenza virus A/Asian/Japan/305/57 which had been passaged four times in eggs, once in ferrets, three times in mice, and eight times in eggs was furnished by Dr. Keith E. Jensen. Ten- to 11-day embryonated eggs were inoculated amniotically, harvested after 48 hours incubation at 37° C., and the CA and A fluids tested separately for hemagglutination using human type O cells. Fluids with a titer of 1:64 or greater were pooled, inactivated at 65° C. for 1 hour, and used as the antigen. Two units of antigen, as determined by titration against positive human serum, were employed. Twofold serial dilutions of serum from 1:20 to 1:320 were tested.

The final test contained 0.2 ml. serum, 0.2 ml. antigen, and 0.2 ml. of guinea pig complement containing two exact units. The tubes were incubated at 37° C. for 75 minutes, and immediately afterwards 0.4 ml. of 2 percent sheep red blood cells sensitized with two units of rabbit hemolysin was added. The results were read after incubation for 20 minutes at 37° C. Comparative studies with incubation at 37° C. for 20 minutes and at 4° C. for 18 hours showed greater specificity with the former but greater sensitivity with the latter.

Virus isolations. Specimens were stored in sealed ampules at −70° C. until tested. Lung tissues were ground with sterile alundum and prepared as a 10 percent suspension in nutrient broth containing 250 μ/ml. penicillin and 250 μg./ml. streptomycin. Nose and throat swabs in tryptose phosphate broth (Difco) were first plated on sheep's blood agar. Penicillin and streptomycin were then added and the broth inoculated amniotically into five 10- to 11-day embryonated eggs. Eggs were harvested after 48 hours incubation at 37° C. and CA and A fluids tested for hemagglutination. Specimens giving a negative reaction were passaged again in eggs and those giving positive reactions identified with the antiserums to the influenza strains, A/Denver/1/57, B/GL/1739/54, and A/Asian/Japan/305/57.

Pattern of Spread

In six of the seven schools children answered questions regarding the presence and characteristics of illnesses occurring in the preceding month. Although there was a variation in the several schools, the relative order of frequency of various signs and symptoms was similar. For example, fever, headache, and sore throat were commonly reported, while diarrhea was infrequently reported. Because of the common clinical characteristics, it was considered likely that the same epidemic disease was present in the various schools.

The pattern of absenteeism in the seven high schools was also similar. All showed an abrupt rise in absence rates reaching a peak of 30 to 40 percent of the enrollment within 7 to 10 days and returning to near normal levels by the third week of the epidemic. Schools 3, 4, 5, and 6, which were in widely separated parts of the county, had the time of maximum absence October 7 to 10 (fig. 1). The peak absence dates for the other three schools preceded or followed this period by 1 or 2 weeks.

The pattern of spread within Dormont (HS 4) was examined in detail. It was assumed that students within a given grade were more intimately in contact with one another and that if the epidemic within the school had started first in a small group, such a pattern of spread might be detected by studying absence by grade and time. The daily incidence rate of absence by grade during the period of the epidemic showed no evidence of differences in time, except possibly in the more explosive development of disease in the ninth grade (fig. 2).

Severity of Illness

In Dormont High School, severity of illness in children of different ages was estimated from the relationship between absence and illness. Illness which was accompanied by absence from school was assumed to indicate greater severity than illness without absence. The students, by grades, were classified into three categories according to illness-absence experience during the period September 24 to October 24, 1957. The pattern was similar in all four grades.

Grade	*Ill and absent (percent)*	*Ill, not absent (percent)*	*Neither ill nor absent (percent)*
9	72	10	17
10	75	7	19
11	76	8	14
12	72	11	17
All students	74	8	18

Illness Characteristics by Time Periods

To determine if the illness exhibited by Dormont students changed in characteristics during the period of greatest absence frequency, students who volunteered to give blood specimens were divided into three subgroups according to the week in which their first day of absence occurred. The frequency of symptoms and signs reported was similar for the three groups although it tended to be lower in the last time period (table 1). The duration of individual absence was similar for the first two periods but tended to be shorter in the last. Since data were collected the day following

Figure 2. Daily incidence rate of absence by week in students by grade, Dormont High School, September–October 1957 and 1958

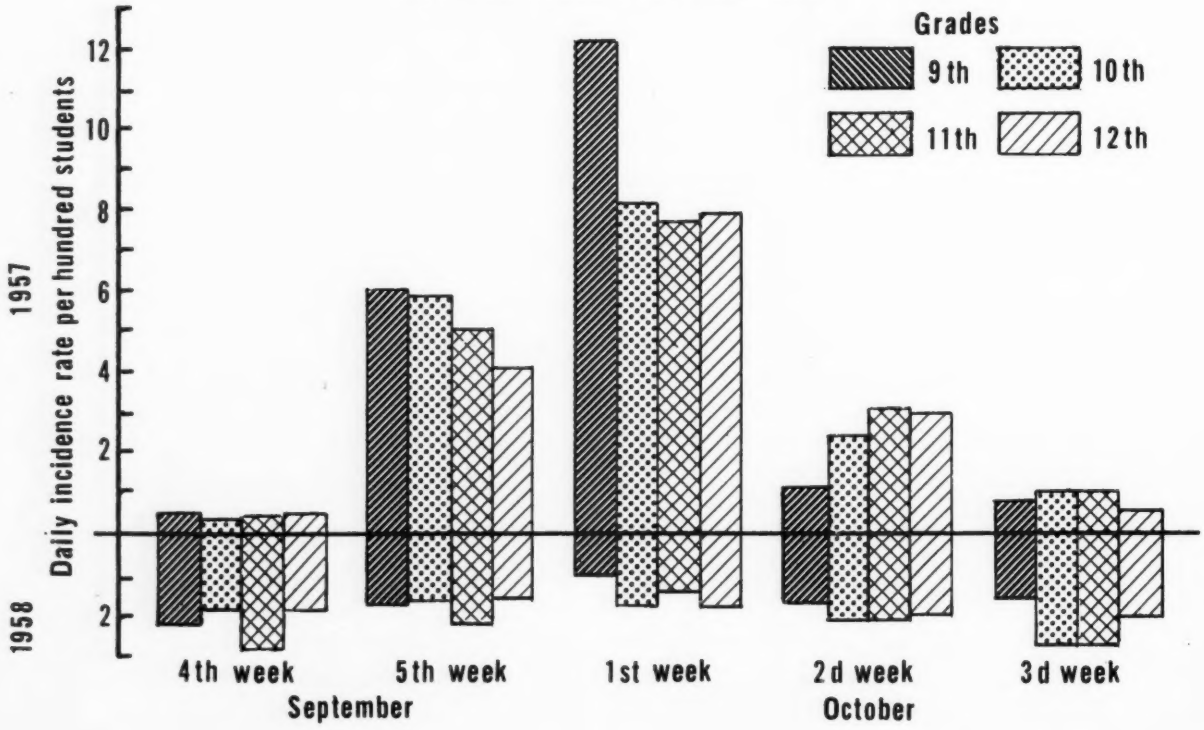


Table 1. Percent frequency of signs and symptoms in 300 students[1] of Dormont High School by week of onset of illness, September–October 1957

Sign or symptom	Onset of illness		
	Sept. 30–Oct. 6 (N=109)	Oct. 7–13 (N=141)	Oct. 14–23 (N=50)
Cough	80	85	72
Fever	81	80	66
Headache	71	77	70
Sore throat	67	72	52
Running nose	60	70	58
Weakness	58	55	42
Body aches	61	40	46
Chills	49	45	44
Dizziness	39	30	28
Retrobulbar pain	27	26	22
Stomach ache	28	17	26
Nausea or vomiting	23	17	14
Diarrhea	2	6	6
Days absent:			
3 days or less	49	51	78
4 days or more	51	49	22

[1] Includes only ill students in volunteer group.

the end of the last time period, observations were not available on students still absent because of illness. Because of persisting absence these students might have been expected to have a large number of symptoms and signs to report and to have longer illnesses.

Serologic Studies, 1957

Approximately two-thirds of the Dormont pupils volunteered to give blood samples in the 1957 study. The rate of volunteering was equal for girls and boys (69 percent and 68 percent, respectively). Girls in all grades volunteered at approximately the same rate, but boys were more numerous in the 9th and 10th grades (80 percent) than in the 11th and 12th grades (53 percent). Participation by classrooms varied from 52 to 89 percent. The lowest rate of volunteering was in one sophomore classroom; only 47 percent of the girls volunteered to give blood samples.

To determine the degree to which the volunteers were typical of the entire high school population, they were compared with the nonvolunteering students in respect to rate of absence and characteristics and severity of illness experienced in the preceding month. The frequencies of specific signs and symptoms are similar in the two groups (table 2). The rates of absence and illness were also similar for the two groups. The close agreement in illness experience in the two groups indicates that the students volunteering to give blood specimens were representative of the whole school population.

Student	*Ill and absent (percent)*	*Ill, not absent (percent)*	*Neither ill nor absent (percent)*
Volunteer	74	9	17
Nonvolunteer	75	6	19

The association was determined between levels of influenza CF antibody and various aspects of illness experience in the 429 Dormont volunteers. There was a consistent tendency for students with higher antibody titers to report various signs and symptoms more frequently. The frequency of symptoms as well as illnesses was markedly diminished in those without detectable antibody (table 3). Similarly, in the other six schools, children without measurable antibodies (titers less than 1:20) were less often ill during the preceding month or, when ill, had fewer signs and symptoms than children with detectable levels of antibody.

Only 23 Dormont students reported receiving influenza vaccinations sometime in the 6 weeks

Table 2. Symptomatology of volunteers and nonvolunteers in Dormont High School ill during September–October 1957

Sign or symptom	Percent with illness showing sign or symptom	
	Volunteer (N=349)	Nonvolunteer (N=178)
Cough	79	74
Fever	76	62
Headache	73	69
Sore throat	65	64
Running nose	64	64
Weakness	52	44
Body aches	47	38
Chills	45	39
Dizziness	33	31
Retrobulbar pain	25	19
Stomach ache	22	19
Nausea or vomiting	18	14
Diarrhea	4	5

Table 3. Percent frequency of signs and symptoms in relation to the level of influenza CF antibody in serums from 429 students, Dormont High School, September–October 1957

Sign or symptom	CF antibody titer			Ratio of percent present [1] to percent absent [2]
	1:40 or greater (N=158)	1:20 (N=78)	Less than 1:20 (N=193)	
Cough	92	69	42	2.0
Fever	86	68	42	1.9
Headache	78	65	45	1.6
Sore throat	66	55	42	1.5
Running nose	62	61	41	1.5
Weakness	66	45	24	2.5
Body aches	50	36	30	1.5
Chills	56	46	20	2.6
Dizziness	45	29	12	3.3
Retrobulbar pain	23	28	15	[3] 1.7
Stomach ache	22	16	17	[3] 1.1
Nausea or vomiting	22	15	8	[3] 2.5
Diarrhea	6	4	2	[3] 2.5
No illness	3	10	32	.2

[1] Titer 1:20 or greater. [2] Titer less than 1:20. [3] Derived from fewer than 35 students.

preceding October 24, 1957. In this small group the proportion of those with present or undetectable antibody titers as well as the proportion of those experiencing illness in the September–October period paralleled that of the nonimmunized group. For this reason the effect of immunization was not considered in this study.

Duration of absence also varied in relation to CF antibody titers. Dormont students (including those without illness) with titers of 1:80 or greater against Asian influenza averaged 3.7 days absence; with titers of 1:40, 3.5 days; with titers of 1:20, 2.8 days; and with titers less than 1:20, 1.7 days.

While it was possible to identify certain symptoms and signs with the epidemic illness and to demonstrate that students exhibiting these were more likely to have detectable CF antibody, the association of history of illness and serologic evidence of infection was not absolute. Students ill and absent but without detectable antibodies and students with less severe illness not requiring absence had quantitatively rather than qualitatively different symptomatology from students with typical illness and detectable antibody levels. Even with mild illness, symptoms and signs, although less frequent than with typical illness, were often those associated with influenza-like disease rather than with distinctly different disorders.

These observations were consistent with infection by a single rather than several agents. Individual variations in response to infection could have resulted from differing degrees of exposure to the agent, differing host thresholds for clinical symptoms and signs with infection, or from differing host ability to produce CF antibody following infection. The fact that children without a history of illness also gave evidence, in some cases, of CF antibody formation supports this interpretation.

Many students gave histories of illness typical of the epidemic disease during September and October 1957 but showed no demonstrable influenza CF antibody. One explanation for this observation would be that these students experienced illness so near to the time when blood samples were obtained that antibody rise had not yet taken place. Therefore, to test this hypothesis, second samples were obtained from 175 children 2 to 3 weeks later.

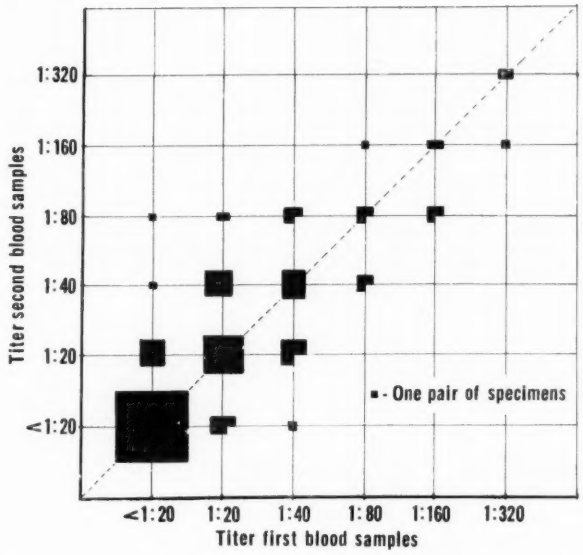
At Dormont, 96 donors of second blood samples were selected from the original volunteers according to their illness experience. The results in the various groups are given in table 4. Of those with illness early in the epidemic, only 3 percent had a rising titer, while approximately 20 percent had a falling titer. Con-

Table 4. Relationship of first and second influenza CF antibody levels in paired specimens from 96 students with varied illness experience, Dormont High School, 1957

Group	Number tested	Rising titer [1] (percent)	Falling titer [1] (percent)	No change (percent)
Ill and absent Sept. 24–Oct. 14	32	3	22	75
Ill and absent Oct. 14–24	23	22	13	65
Ill, not absent Sept. 24–Oct. 24	17	0	18	82
Not ill or absent Sept. 24–Oct. 24	24	13	8	79

[1] A twofold or greater change in titer.

Figure 3. Relationship of first and second influenza CF antibody titers in 175 students, Allegheny County, Pa., October–November 1957



versely, of those with illness late in the epidemic, more had rising than falling titers. However, the magnitude of most of these rises and falls was only twofold, and only 7 percent of patients previously negative became positive by the time the second specimens were obtained. The constancy of antibody level in successive samples suggests that presence of antibody was not a transient phenomenon likely to be missed by variations in the time of sampling. Therefore, the absence of antibody with the influenza syndromes can not be explained on the basis of the time the specimens were obtained.

Second blood samples, obtained from an additional 79 students in two other high schools, confirmed the close agreement between antibody levels on specimens obtained 3 to 4 weeks apart (fig. 3).

Hypothetical Influenza Syndromes

The signs and symptoms were ranked in order of frequency of occurrence in Dormont students exhibiting measurable antibody (table 3). This was assumed to constitute a measure of sensitivity of a particular symptom or sign as indicating influenza infection. However, certain of these were also noted with high frequency in children lacking antibody. Therefore, a measure of specificity was also developed and was expressed as the ratio of the frequencies with which given symptoms and signs occurred in the antibody present and undetectable groups. These ratios were ranked in order of magnitude. The sum of the rank order of sensitivity and the rank order of specificity was calculated. For example, cough was first in sensitivity and fourth in specificity, giving a sum of five. The signs and symptoms with the lowest sums of sensitivity-specificity ranks were presumed most likely to be characteristic of Asian influenza. These were cough, fever, headache, weakness, chills, and dizziness.

Using the results of these sensitivity-specificity ratings, three categories of illness were arbitrarily defined: (*a*) strict influenza syndrome which consisted of a history of absence from school with an illness having three or more of the following symptoms or signs: cough, fever, headache, weakness, chills, and dizziness; (*b*) modified influenza syndrome which consisted of an illness having three of the above symptoms or signs without absence or two of the symptoms and signs with absence; (*c*) other disease which consisted of any illness, regardless of absence, not fitting the strict or modified syndrome categories. The three groups were mutually exclusive.

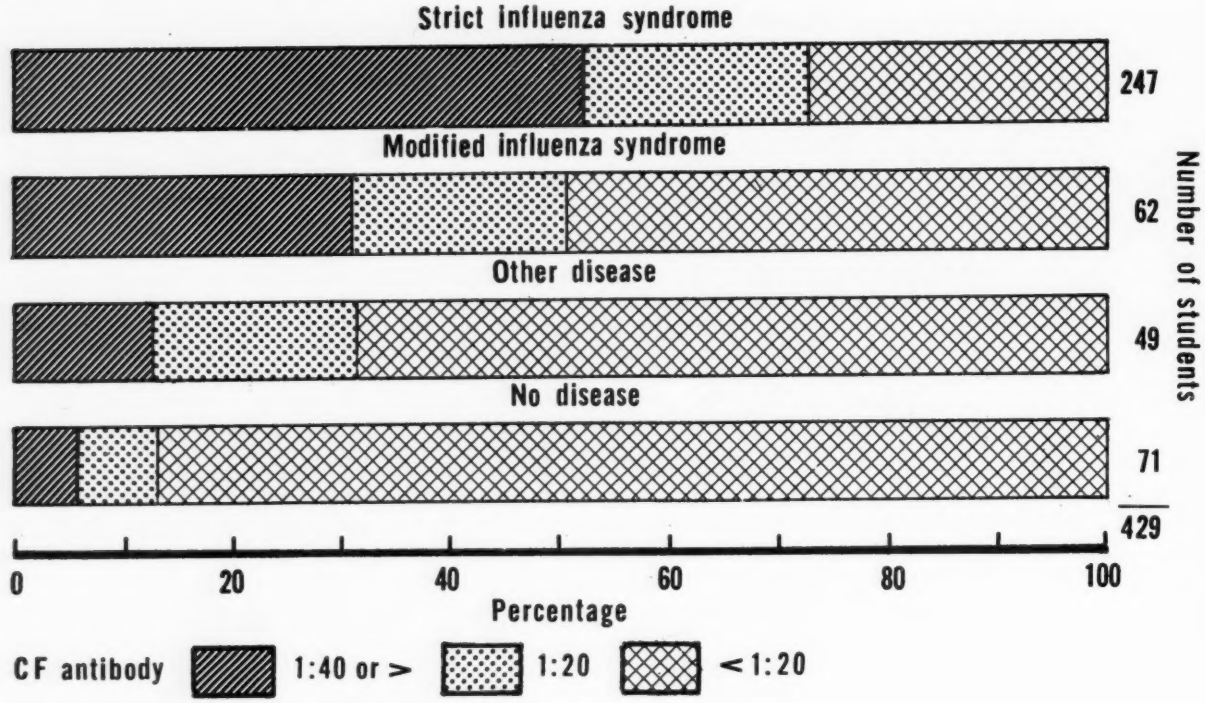
When students were divided into these illness categories or grouped according to antibody titer, there appeared to be a gradient of illness involvement (moving from strict syndrome, to modified syndrome, to other disease, to no disease) which was directly associated with the height of antibody titers (fig. 4).

Comparison 1957, 1958

All 804 Dormont students again answered questions concerning the characteristics of illness experienced during September and October of 1958. These data were compared with data collected in 1957. Illness-absence experience for 1958 was classified by grade.

Grade	*Ill and absent (percent)*	*Ill, not absent (percent)*	*Neither ill nor absent (percent)*
9	23	9	68
10	24	11	65
11	27	6	67
12	22	5	73
All students	24	8	68

Figure 4. Relation of clinical gradient of illness involvement to level of influenza CF antibody, Dormont High School, September–October 1957



Again, there was no difference in the pattern by grade. However, when the 2 years were compared, there were approximately one-third as many in the category of ill and absent and approximately four times as many in the category neither ill nor absent in 1958 as in 1957.

When 1958 incidence rate of absence was plotted by grade (fig. 2), there was no variation by week or grade.

When symptoms and signs exhibited during illness were compared for the 2 years, students in 1957 not only reported almost twice as many symptoms and signs per illness, but certain specific signs and symptoms were much more frequently reported. Fever, weakness, chills, body aches, and pain behind the eyes were reported two and a half to more than three times as frequently in illnesses occurring in the epidemic year. On the other hand, the frequencies with which diarrhea, nausea or vomiting, and stomach ache were reported were essentially the same in both years.

Illnesses of 1958 were grouped according to the 1957 classification of strict and modified influenza syndromes, other disease, and no disease. The percentage of students falling into each category differed markedly in the 2 years (fig. 5). Because of the great difference in the numbers of children with no disease between 1957 and 1958, only ill children were considered. It appears that the illnesses experienced in 1957 and 1958 differed markedly not only in attack rate but also in symptomatology.

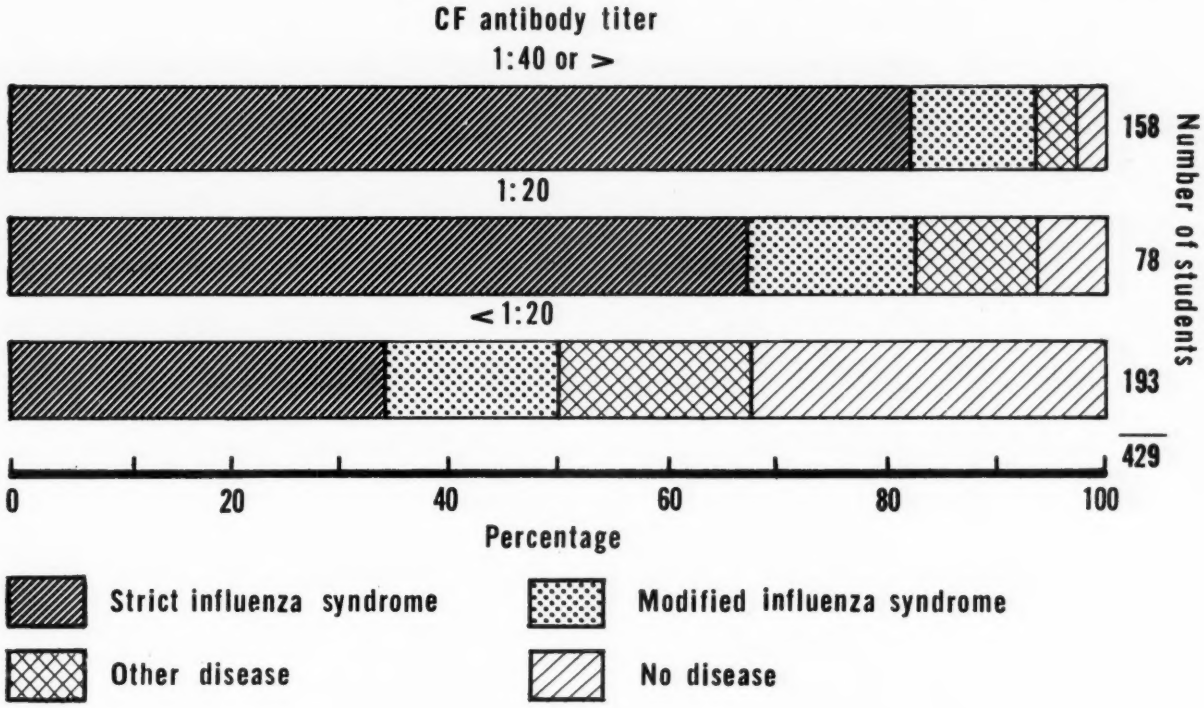
	Percent ill children by category	
Category	*1958*	*1957*
Strict influenza syndrome	17.9	66.6
Modified influenza syndrome	25.3	17.7
Other disease	56.8	15.7

Spring 1959 Illness

During March and April 1959 increased school absenteeism due to influenza-like illness was reported to the Public Health Service from 29 States and the District of Columbia. In 16 States and the District isolations of type B influenza were reported but they were few in number and made with difficulty.

Between March 9 and 27, 1959, absence in Dormont High School reached a peak of 23 percent of the enrollment during the second

Figure 4. Relation of clinical gradient of illness involvement to level of influenza CF antibody, Dormont High School, September–October 1957—Continued



week, and about 70 percent of the children were absent at some time during this period. Prevalence rates and length of absence (approximately 3.5 days) were similar for all grades. Attempts to isolate an influenza virus from throat swabs of 17 students in the first day of clinical illness were unsuccessful.

Clinical characteristics of the illnesses were studied to determine the possible etiological agent and the proportion of absence caused by the illnesses. The 1957–58 questionnaire concerning signs and symptoms of illness was given to 103 children returning from absence on March 16 and 17, 1959. Sixty percent of children had symptomatology compatible with the strict influenza syndrome previously described, 17 percent were classified as modified syndrome, and 23 percent as other disease. These figures were in close agreement with the symptomatology reported with Asian influenza in 1957 and markedly different from the experience in October 1958.

Because of the high prevalence of the characteristic influenza syndrome, the known high level of immunity to Asian influenza in this population, and the isolation during the same time period of influenza type B in similar outbreaks in other parts of the United States, it was considered likely that most of the absence in Dormont High School from March 9 to 27, 1959, was due to influenza type B infection.

Virus Isolation

Starting in July 1957 throat swabs and washings for virus isolation from patients suspected

Figure 5. Gradient of illness involvement of Dormont High School students, September–October 1957 and 1958

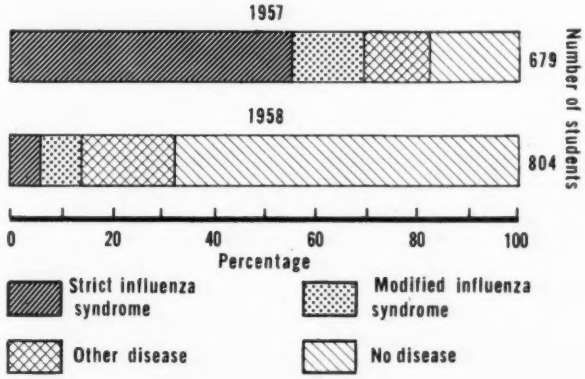


Table 5. Asian variant type A influenza virus isolations from specimens received by the Allegheny County Health Department laboratory, July–December 1957

Month	Throat swab or washing		Autopsy: lung tissue or bronchial swab	
	Number specimens	Percent positive	Number specimens	Percent positive
July	1	0	(1)	-------
August	5	0	(1)	-------
September	59	15	(1)	-------
October	371	30	24	58
November	25	4	6	0
December	12	0	6	0

[1] No specimens.

of having influenza were received at the Allegheny County Health Department laboratory. As illness in the community increased and physicians became more aware of the diagnostic service available, more specimens were submitted. In the last quarter of the year lung tissue and bronchial secretions obtained at autopsy were also submitted. Asian variant type A influenza virus was isolated in 1957 only during September, October, and November. The data indicate that the highest percentage of virus isolation from specimens from all sources occurred during October when the population of the county was experiencing the peak of an epidemic (table 5).

Discussion

Both serologic and clinical indexes were used to estimate the incidence of infections caused by Asian variant influenza type A virus in the 1957 epidemic in Dormont High School. Since this virus was newly introduced into the United States during the summer and late fall of 1957, the percentage of persons showing antibody to it after an epidemic of influenza-like illness could be considered one index of group infection. In other populations studied after such an epidemic illness in the same year, specific antibodies (CF or hemagglutination inhibition) were reported in 35 to 75 percent of persons (with and without history of illness) from whom blood samples were obtained (*1*, *2*). In Dormont High School specific antibody was exhibited by 55 percent of the total population studied and in 63 percent of those children ill during the epidemic.

The validity of using the clinical history as an index of influenza infection was based on the highly characteristic signs and symptoms occurring in previous influenza epidemics and reported in the 1957 influenza-like illnesses in various parts of the world (*1*, *3–6*). These were fever, headache, cough, sore throat, fatigue or malaise, chills or chilliness, ocular pain, and bone, muscle, and joint ache. Nausea, diarrhea, abdominal pain, chest pain, and rash were almost always absent. In addition, these illnesses were characterized by sudden onset, high attack rate, moderate severity, short duration, and rare complication by secondary infection.

A majority of these symptoms was also evidenced in histories given by ill students in the Dormont school. Sixty-seven percent exhibited a strict influenza syndrome consisting of absence from school plus three or more of these signs and symptoms—fever, cough, headache, dizziness, chills, and weakness. Further evidence that this 1957 epidemic illness had distinct symptomatology was supplied by a study of illness characteristics during the same time period the following year. In 1958 only 18 percent of the ill children exhibited the strict influenza syndrome.

In the previously cited studies of Asian influenza infections in other populations, positive association between a clinical history of influenza-like illness and presence of specific antibody was reported. In Dormont High School this was also true. Sixty-seven percent of children with strict influenza syndrome had detectable levels of specific antibody as compared with 50 percent with the modified influenza syndrome, 31 percent with other illness, and 13 percent with no illness. However, the lack of association between presence of antibody and a history of influenza-like illness has also been reported previously in both natural and experimental infections. Bell and associates (*7*) artificially induced Asian influenza infections in volunteers and demonstrated not only variations in clinical response of different individuals given equal dosage of virus

but also development of serologic evidence of infection in asymptomatic subjects. Therefore, the minimum incidence of Asian influenza infection in the Dormont school was considered to be represented by the number of children exhibiting specific antibody or a history consistent with the influenza syndromes, or both. The incidence, thus determined, was 78 percent.

Since the antibody test identified few children who were not already identified by the clinical pattern of illness, but not vice versa, it was concluded that clinical history alone (presence of influenza syndromes) might constitute a satisfactory estimate of the incidence of Asian influenza infection. If such a clinical history index were also a valid measure of incidence of influenza infection due to other types, it would have the advantage of minimizing the need for laboratory studies. However, the syndrome derived from an epidemic experience is not necessarily applicable in nonepidemic years. In the fall of 1958 no isolations of influenza virus were made locally and essentially none was reported nationally. Yet, during this same period 5 percent of the population of Dormont High School demonstrated the strict influenza syndrome, and 7 percent, the modified influenza syndrome.

The method described in this study for establishing incidence of a specific infection during an epidemic might be applied to the study of other epidemic illnesses. The method consists of selecting the signs and symptoms reported most frequently with illnesses during an epidemic period (sensitivity); obtaining blood samples during the acute and convalescent stage (or in the convalescent stage only with a newly introduced agent) from a representative sample of the study population to determine antibody against the determined etiological agent; and calculating the signs and symptoms most frequently present in patients exhibiting changes in titer of specific antibody (specificity). By combining sensitivity and specificity indexes, a clinical syndrome may be constructed for use in estimating incidence of specific illness in other groups during an epidemic.

Summary

The etiology of an epidemic of acute influenza-like illness in Allegheny County, Pa., in the fall of 1957 was investigated. High school students were questioned concerning symptomatology of any illnesses during this time period and CF tests against the Asian variant of influenza type A were done on blood samples from part of this group. The signs and symptoms reported most commonly with illness during this period (sensitivity) were combined with the signs and symptoms most frequently present in patients exhibiting changes in titer of specific antibody (specificity). The combined sensitivity-specificity index was used to construct a clinical syndrome considered appropriate for estimating incidence of specific illness during an epidemic period.

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(1) Carey, D. E., et al.: Community-wide epidemic of Asian strain influenza. J.A.M.A. 167: 1459–1463, July 19, 1958.

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(4) Fry, J.: Influenza A (Asian) 1957, clinical and epidemiological features in a general practice. Brit. M.J., 1: 259–261, Feb. 1, 1958.

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(7) Bell, J. A., et al.: Artificially induced Asian influenza in vaccinated and unvaccinated volunteers. J.A.M.A. 165: 1366–1373, Nov. 16, 1957.

Health Research Facilities Grants

Fifty-seven grants to help build and equip additional health research facilities were approved by the Public Health Service in August 1959 for 47 institutions in 23 States and the District of Columbia.

The grants, totaling $11,235,480, are made on a matching-fund basis. They are authorized by the contingent resolution for fiscal year 1960 passed by the Congress on June 30, 1959, and are the first awards under the 3-year extension authorized by the 85th Congress during 1958. The extended program, like the initial one set up in 1956, has at its disposal $30 million annually.

Administered by the National Institutes of Health, Public Health Service, the health research facilities construction program awards grants to both public and nonprofit hospitals, medical and dental schools, schools of public health, and other research institutions. The recipient institutions and facilities follow.

Alabama

University of Alabama, Birmingham: equipment for clinical research laboratories, $144,126.

California

The California Institute of Technology, Pasadena: equipment for sanitary engineering research, $39,900.

City of Hope Medical Center, Duarte: facilities for medical research $112,000.

Stanford Research Institute, Menlo Park: biological research laboratories and equipment, $300,000.

University of California, Los Angeles: scientific equipment for new wing of medical center for basic research in neurology and psychiatry, $107,625.

University of California, Berkeley: health sciences research building and equipment, $1,292,975.

University of San Francisco: equipment for previous award for chemistry and biology research laboratories, $8,778.

District of Columbia

Catholic University of America: biology building and equipment, $216,642.

Georgetown University: science and basic health research building, $350,000.

Florida

Florida Agricultural Experiment Station, University of Florida, Gainesville: research equipment for previous construction grant for veterinary science, $15,064.

National Children's Cardiac Center, Miami: medical research building and equipment, $72,877.

Illinois

Armour Research Foundation of Illinois Institute of Technology, Chicago: equipment for previous construction grant for research laboratories in chemistry building, $12,250.

Presbyterian-St. Luke's Hospital, Chicago: equipment for previous construction grant for medical science research building, $24,780.

University of Chicago, Chicago: clinical research building, $1,068,034; research equipment for chronic disease hospital, $11,489.

University of Illinois, Chicago: construction and equipment for research in zoonoses, $128,100.

Indiana

Purdue University, Lafayette: research facilities for speech pathology and bioacoustics, $24,331.

Indiana University, Bloomington: psychological research building, $543,700.

Kansas

Kansas State University of Agriculture and Applied Science, Manhattan: dairy and poultry research building, $93,020.

University of Kansas Medical Center, Kansas City: medical science building and equipment, $850,200.

Maryland

Johns Hopkins University, Baltimore: equipment for previous grant for biophysics research building, $22,806.

Massachusetts

Massachusetts General Hospital, Boston: equipment for previous grant for research facilities at McLean Hospital, Waverly, $5,775.

Massachusetts General Hospital, Boston: expansion, remodeling, and equipment for pediatric neurology research unit, $98,425.

University of Massachusetts, Amherst: bacteriology and zoology research laboratories and equipment, $132,212.

Michigan

University of Michigan, Ann Arbor: equipment for previous construction grant for college of pharmacy, $17,500.

Wayne State University, Detroit: equipment for previous grant for microbiology and organic chemistry research facilities, $47,250.

Minnesota

University of Minnesota, Minneapolis: equipment for biological laboratory building for Hormel Institute, $28,002.

Missouri

Washington University, St. Louis: equipment for previous grant for medical research laboratories, $68,250.

Montana

Montana State College, Bozeman: equipment for veterinary research building, $14,331.

Nebraska

University of Nebraska, Omaha: equipment for previous grant for research addition to university hospital, $21,350.

New York

Beth Israel Hospital, New York: renovation and expansion of research laboratories and equipment, $184,865.

Maimonides Hospital, Brooklyn: equipment for medical science research building, $38,500.

State of New York (Roswell Park Memorial Institute), Buffalo: equipment for previous grant for basic science research institute in field of cancer and allied diseases, $56,525.

University of Buffalo, Buffalo: equipment for health sciences building, $48,828.

Waldemar Medical Research Foundation, Port Washington: equipment for basic medical research, $1,062.

North Carolina

University of North Carolina, Chapel Hill: additional grant for medical science research building, $25,300; research equipment for school of pharmacy, $36,750; school of public health research facility, $653,000.

Ohio

Children's Hospital, Columbus: equipment for medical science research building, $15,750.

Columbus Psychiatric Institute and Hospital, Columbus: equipment for addition to psychiatric research wing, $31,282.

Ohio State University, Columbus: equipment for sanitary engineering research facility, $5,000; equipment for veterinary pathology research building, $50,000.

Western Reserve University, Cleveland: equipment for research, Mather Building, $165,865.

Oregon

Reed College, Portland: addition to chemistry building, $47,529.

University of Oregon Medical School, Portland: medical science research building and equipment, $1,297,955.

University of Oregon Dental School, Portland: basic science research laboratories, $71,900.

University of Oregon, Eugene: expansion of science building for Institute of Molecular Biology, $277,641.

Pennsylvania

St. Christopher's Hospital, Philadelphia: equipment for pediatric research laboratories, $17,500.

University of Pennsylvania, Philadelphia: equipment for previous grants for medical research buildings, $130,095.

Rhode Island

Brown University, Providence: building for research in biology, $476,700.

Tennessee

Meharry Medical College, Nashville: medical research building, $200,000.

University of Tennessee, City of Memphis Hospitals: radiological research facility and equipment, $144,422.

University of Tennessee, Memphis: dental-pharmacy research facility and equipment, $325,000.

Virginia

University of Virginia, Charlottesville: life sciences research building, $612,500.

Washington

State College of Washington, Pullman: biological sciences annex, $377,498; plant sciences research building, $65,000.

Wisconsin

University of Wisconsin, Madison: equipment for chemical research laboratory, $7,221.

PUBLICATION ANNOUNCEMENTS

Address inquiries to the publisher or sponsoring agency. WHO publications may be obtained from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.

A Psychiatric Look at Children. Special issue of Public Health News, vol. 40, No. 6, June 1959, pp. 155–215. New Jersey State Department of Health, 129 East Hanover Street, Trenton 25, N.J.

Automobile Litter Containers. Project guide number 1. 18 pages. Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

Litter Receptacles. Project guide number 2. 17 pages. Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

Litter Laws. Project guide number 3. 34 pages. Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

10 Years of Cleansing New Jersey's Streams and Waters. A summary report of activity, 1948–1958. 37 pages. New Jersey State Department of Health, 129 East Hanover Street, Trenton 25, N.J.

Easter Seal Research Foundation. A report. 1959; 40 pages. National Society for Crippled Children and Adults, Inc., 2023 West Ogden Avenue, Chicago 12, Ill.

Food Guide for Older Folks. Home and Garden Bulletin No. 17. Prepared by Institute of Home Economics, Agricultural Research Service, U.S. Department of Agriculture. Revised June 1959; 16 pages; 10 cents. U.S. Government Printing Office, Washington 25, D.C.

A Statement on Arteriosclerosis. Main Cause of "Heart Attacks" and "Strokes." By Paul Dudley White, M.D., and others, supported by 106 members of the American Society for the Study of Arteriosclerosis. 19 pages. National Health Education Committee, Inc., 135 East 42d Street, New York 17, N.Y.

Group Methods in Therapy. Public Affairs Pamphlet No. 284. By Jerome D. Frank, M.D. 1959; 28 pages; 25 cents. Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y.

Progress and Problems of Community Mental Health Services. Papers presented at the 1958 Annual Conference of the Milbank Memorial Fund, held October 22–23, 1958, at the New York Academy of Medicine. Part I. 1959; 232 pages; $2. Milbank Memorial Fund, New York, N.Y.

Progress in Action. How the Metropolitan Sewer District Brings Sewers to Your Neighborhood for a Healthier and More Attractive Community. 9 pages. Metropolitan St. Louis Sewer District, 901 Washington Avenue, St. Louis 1, Mo.

"You Are Not Alone." A guide to sources of care and treatment of the crippled child. By Lawrence J. Linck. 1959; 32 pages; 25 cents. National Society for Crippled Children and Adults, Inc., 2023 West Ogden Avenue, Chicago 12, Ill.

Food Habits of New Canadians. A report prepared by the Toronto Nutrition Committee. 1959; 36 pages; 50 cents. Bakery Foods Foundation of Canada, 20 Carlton Street, Toronto 5, Ontario, Canada.

General Handbook for Radiation Monitoring. Compiled and edited by Jerome E. Dummer, Jr., for the U.S. Atomic Energy Commission. 1959; 180 pages; 60 cents. U.S. Government Printing Office, Washington 25, D.C.

Home Care of the Child with Rheumatic Fever. A Guide for Parents. 1959; 25 pages; no charge for single copies. American Heart Association, 44 East 23d Street, New York 10, N.Y.

Let's Be Practical About a Nursing Career. With a list of State approved schools of practical nursing, 1959–1960. May 1959; 36 pages. Committee on Careers, National League for Nursing, 10 Columbus Circle, New York 19, N.Y.

Coccidioidomycosis (Valley Fever) in Arizona. Special issue of Arizona Public Health News, vol. 52, No. 2, March–April 1959, 27 pages. Arizona State Department of Health, Phoenix.

Released Mental Patients on Tranquilizing Drugs and the Public Health Nurse. Nursing Research Monograph No. 1, Department of Nurse Education, New York University. By Ida Gelber, Ed.D., R.N. 1959; 139 pages; $3. New York University Press, Washington Square, New York 3, N.Y.

Agricultural Migrant Film Listing. June 1959; 8 pages. Division of General Health Services, Public Health Service, Washington 25, D.C.

News in Review. Monthly newsletter from the Metropolitan Sewer District to local governments on problems of mutual significance. (Distributed to officials and elected representatives in the Greater St. Louis area.) Metropolitan St. Louis Sewer District, 901 Washington Avenue, St. Louis 1, Mo.

World Health Organization

Zoonoses. Second Report of the Joint WHO/FAO Expert Committee on Zoonoses. WHO Technical Report Series No. 169. 1959; 83 pages; 60 cents.

Mental Health Problems of Aging and the Aged. Sixth Report of the WHO Expert Committee on Mental Health. WHO Technical Report Series No. 171. 1959; 51 pages; 60 cents.

Biological Standardization. Twelfth Report of the WHO Expert Committee on Biological Standardization. WHO Technical Report Series No. 172. 1959; 43 pages; 30 cents.

Cholera. By R. Pollitzer, M.D. WHO Monograph Series No. 43. 1,000 pages; $20.

World Directory of Venereal-Disease Treatment Centres at Ports. Application of the International Agreement of Brussels, 1924, respecting facilities to be given to merchant seamen for the treatment of venereal diseases. 1959; 162 pages; $1.75.

Animal Inhalation Exposure Chambers

Public Health Monograph No. 57

Exposure Chambers for Research in Animal Inhalation. *By David A. Fraser, Ronald E. Bales, Morton Lippmann, and Herbert E. Stokinger.* Public Health Monograph No. 57 (PHS Pub. No. 662), 54 pages, illustrated. U.S. Government Printing Office, Washington, D.C., 1959, price 40 cents.

The accompanying summary covers the principal contents of Public Health Monograph No. 57, published concurrently with this issue of *Public Health Reports*. The authors are with the Occupational Health Field Headquarters, Occupational Health Branch, Public Health Service.

For readers wishing the data in full, copies are on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Official agencies and others directly concerned may obtain single sample copies without charge from the Public Inquiries Branch, Office of Information, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

The phenomenal increase in the amounts and kinds of chemicals used in industry, in the defense establishments, and in the home, with attendant concern about the potential health effects of community air pollution, has aroused a demand for toxicity information that can be gained only through carefully controlled studies of inhalation toxicology. New investigators entering the field often encounter a bewildering array of sizes and shapes of exposure chambers and accessory equipment, and are faced with the choice of either copying a chamber designed by a previous worker for a different set of conditions or developing their own design through a time-consuming series of trial and error experiments.

To help these investigators avoid some common difficulties and sources of error, the Occupational Health Branch of the Public Health Service has prepared a monograph on exposure chambers for research in animal inhalation, drawing on more than 40 years' experience with animal inhalation studies by investigators in its laboratories, as well as the experience of other research centers and private investigators.

The Occupational Health Field Headquarters laboratory currently uses four types of total-enclosure exposure chambers: large-scale, control, small-scale, and pilot. The features of each type that have proved of value in ease of operation and maintenance, in reliability of performance, and in adaptability are described in detail. Emphasis is placed on the fundamental requirements of the chambers and the reason for each particular design. Design considerations, such as size, shape, construction materials, maintenance, animal complement and placement, airflow requirements, heat balance, and air conditioning, are discussed.

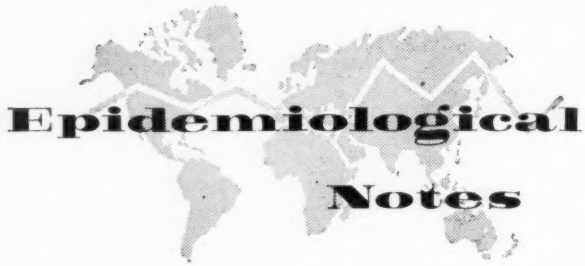
Since the maintenance of a desired test atmosphere is the most important aspect of animal exposure chamber operation, attention is given to the various interdependent factors which influence this atmosphere. All test atmospheres fall into one of three general categories: dispersion of solid particulates in air, mist or dispersion of liquid droplets in air, and gas or vapor forming a single and homogeneous phase with air. These are dealt with in order of decreasing complexity and difficulty of producing and maintaining satisfactory performance in the chamber. Basic equations and formulas affecting particles and chamber dynamics are given and used to predict the performance of specific chambers.

Routine day-to-day operation of the chambers is described with suggestions for safety

precautions and increased precision of operation through the use of automatic accessory equipment. Some of the forms and methods that are used by the laboratory for recording data can serve as a guide for newcomers in the field.

With an understanding of these fundamental concepts, the investigator should be able to modify any of the chambers described to meet the requirements of his own experiment with a minimum of time and effort and little sacrifice of essential performance characteristics.

The monograph also includes a comprehensive and critical summary of the literature and history of animal inhalation exposure chambers from the first report in 1865 to the present. There are more than 80 references and 30 illustrations and tables.



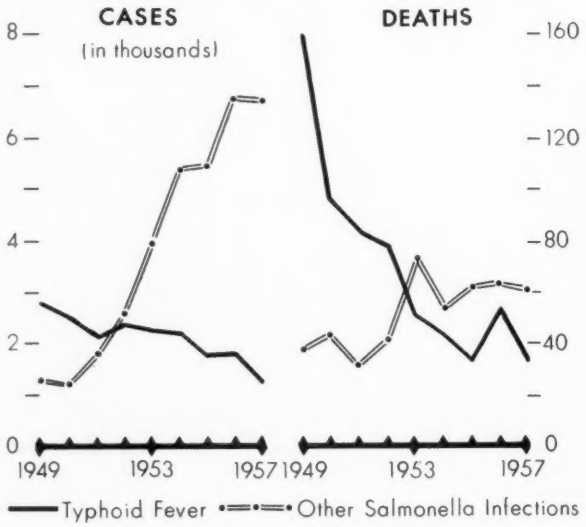
Salmonellosis

During the past decade, while typhoid fever has been reported less frequently and has caused fewer deaths from year to year, other *Salmonella* infections have shown the opposite trend. In 1950 twice as many cases and deaths from typhoid fever were recorded as for other *Salmonella* infections (see chart). In 1957, however, there were five times more cases of the latter than of typhoid fever, and the number of deaths was also in excess of those for typhoid fever. The increase in deaths has been more evident in young children and in persons over the age of 55 years.

The increase in number of reported cases of *Salmonella* infections, exclusive of typhoid fever, probably is due mainly to more complete notification which has followed greater awareness of these infections and an improvement in facilities for laboratory diagnosis. It also seems reasonable to assume that more frequent certification of deaths from these infections is due partly to such factors.

As typhoid fever has only one known reservoir of infection, man, its control is relatively simple. The other *Salmonella* infections are common to many species of animals, as well as man, and the disease can be transmitted not only by contact with infected animals and their excreta but also by consumption of the meat or other products of infected animals. The control of these infections is difficult because they are so widely distributed.—CARL C. DAUER, M.D., *medical adviser, National Office of Vital Statistics, Public Health Service.*

Numbers of cases and deaths from typhoid fever and other Salmonella infections, 1949–57



Federal Publications

Working Paper on Financing Migrant Health Services. *The President's Committee on Migratory Labor; June 1959; 67 pages.*

Methods either currently in use or proposed to finance health services for foreign, offshore, and domestic migratory farmworkers in the continental United States are discussed. A resource document based on the study initiated in May 1957, this paper also describes inherent problems of migratory laborers and emphasizes the need to provide them with year-round health insurance coverage.

A limited number of copies are available from the Division of Special Health Services, Public Health Service, or the President's Committee on Migratory Labor, Department of Labor, Washington 25, D.C.

Brucellosis in the U.S.S.R. A review of the literature. *PHS Publication No. 635; 1959; by Julian Hoptman; 77 pages; 30 cents.*

Designed to acquaint medical scientists with research activities and progress within the U.S.S.R., this monograph evaluates the investigations, related developments, and control of brucellosis in the Soviet Union.

Discussions of the history, epidemiology, clinical aspects, pathology and pathogenesis, biochemical studies, diagnosis, resistance and immunity, and therapy provide a description of brucellosis in man and veterinary problems pertaining to it.

Activities of the National Institutes of Health in the Field of Gerontology, January 1959. *PHS Publication No. 695; 1959; 121 pages.*

Intramural and extramural research and training projects on aging conducted by the National Institutes of Health are listed and briefly described.

Identified as being either primarily or secondarily related to gerontology, the projects are classified according to major discipline. General, major multidisciplinary, and training projects are listed separately.

Names and addresses of the principal investigators are provided.

Mid-American Conference on Migratory Labor. *Council of State Governments and President's Committee on Migratory Labor; 1959; 50 pages.*

This presentation of the conference proceedings includes recommendations, papers by the principal speakers, and general discussion summaries on children and youth, housing and sanitation, public health and public assistance, and employment.

Copies may be obtained from the President's Committee on Migratory Labor, U.S. Department of Labor, Washington 25, D.C.

Directory of State and Territorial Health Authorities, 1959. *PHS Publication No. 75; 1959 revision; 102 pages; 35 cents.*

Revised as of May 1959, this directory lists personnel of each State and Territorial health department. Included also are officials of other State agencies directing grant-in-aid programs of the Public Health Service and of the Children's Bureau grant program for crippled children's services.

Personnel of the Public Health Service in charge of functions closely associated with State health departments are listed in the appendix.

Serologic Tests for Syphilis, 1959 Manual. *PHS Publication No. 411; revised 1959; 142 pages; $2.50.*

This water- and grease-proof plastic covered manual provides a ready reference to the latest technical procedures for performing each of the serologic tests for syphilis commonly employed in the United States.

New tests include fluorescent treponemal antibody, rapid plasma reagin, *Treponema pallidum* complement fixation using small volumes, *T. pallidum* immobilization, one-fifth Kolmer with Reiter protein antigen, and the Kahn test with cardiolipin antigen.

General information and general equipment are included as well as an appendix which describes methods of collecting and preserving sheep blood, preparation of hemolysin, preparation and preservation of complement, and use of merthiolate as a bacteriostat.

Proceedings, 1959 Biennial Conference of the State and Territorial Dental Directors. *PHS Publication No. 698; 1959; 62 pages.*

Principles of human behavior derived from behavioral research and their implications for dental public health practice are the subjects of seven papers. Also included are the address by the president of the Association of State and Territorial Dental Directors, recommendations of the conference, and recommendations of the association.

Sinus Infection (Sinusitis). *PHS Publication No. 172 (Health Information Series No. 34); revised 1959; leaflet; 5 cents, $2 per 100.* Presents latest information on sinusitis, outlining causes, signs, prevention, and treatment.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

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Echoes

APPORTIONMENT OF FINANCIAL AID FOR COUNTY HEALTH WORK

By ELBRIDGE SIBLEY, *Statistician, Tennessee State Department of Health,* and JOSEPH W. MOUNTIN, *Surgeon, United States Public Health Service*

INTRODUCTION

There is rapidly developing in the United States a plan of local health organization commonly known as the county health department. Under this plan the rural portions of the county, as well as the contained cities and towns, are served by a single health department. These departments have developed, in most instances, under the leadership and guidance of the State health department.

Financial aid from the State and other sources outside the county has played an important part in the development and stabilization of this movement; yet there does not seem to have been developed an equitable plan of apportionment which could be applied successfully under varying conditions.

PURPOSE OF STATE AID [1]

In general, there are three major ends to be served by any system of subsidies from central to local governments for health work: First, a subsidy may be used to encourage the initiation of new projects; second, a system of aid provides a desirable channel through which the central health agency may discharge its responsibility to the local unit of government; third, the subsidy can ease the burden of relatively poor counties and thus make possible a more uniform grade of continuing service.

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Elbridge Sibley and Dr. Joseph W. Mountin outline plans of apportioning subsidies to local health departments appropriate to the purpose of the aid as well as to local circumstances and resources.

U.S. GOVERNMENT PRINTING OFFICE: 1959